APPENDIX B
Traffic Impact Analysis

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TRAFFIC IMPACT ANALYSIS

PEACEFUL VALLEY RANCH (TM – 5341 RPL5)

Log No. 04-19-007, GPA 03-05, R03-15, MUP 04-048

JAMUL, CALIFORNIA

April 24, 2007

LLG Ref. 3-03-1266

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TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

DESCRIPTION	PAGE

LIST OF FIGURES

LIST OF TABLES

DESCRIPTION	PAGE

APPENDICES

TRAFFIC IMPACT ANALYSIS
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COUNTY OF SAN DIEGO
April 24, 2007

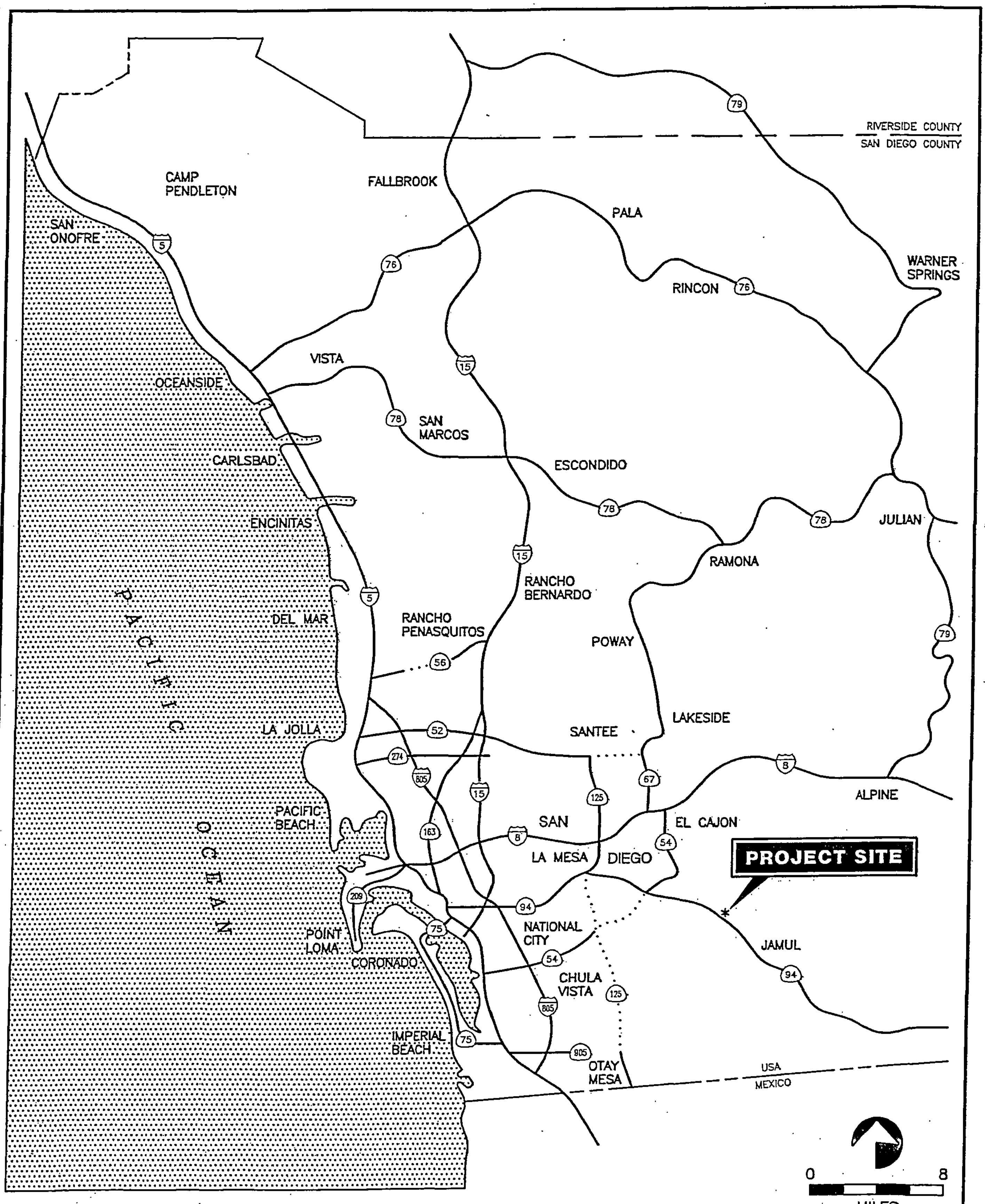
1.0 Introduction

The following traffic study has been prepared to determine and evaluate the traffic impacts on the surrounding circulation system due to the proposed development of the Peaceful Valley Ranch, a single-family home subdivision. In addition to the single-family homes, the project proposes an equestrian facility, a lot reserved for a future fire station, and a private horse stable. It should be noted that subsequent to this iteration of the traffic report, the single-family portion of the project has been reduced from 47 to 46 dwelling units. The analysis reflects the more conservative 47 dwelling units. The proposed site is situated on the east side of State Route (SR) 94, just south of Melody Road.

Included in this traffic study are the following:

- Project description;
- Existing conditions description;
- Project trip generation/distribution/assignment;
- Cumulative projects discussion;
- Significance criteria;
- Traffic Analysis methodology;
- Intersection and street segment capacity analyses;
- On-Site Traffic Circulation, Sight Distance And Other Issues
- Assessment of Access Issues Associated with the Deletion of a Portion of SC 760 from Olive Vista Drive to SR 94
- Year 2030 Discussion; and
- Significance of impacts/Mitigation Measures.

Figure 1 shows the general location of the project, while **Figure 2** shows a more detailed project area map.



Source: LLG Engineers, 2004

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Figure 1

VICINITY MAP

PEACEFUL VALLEY RANCH

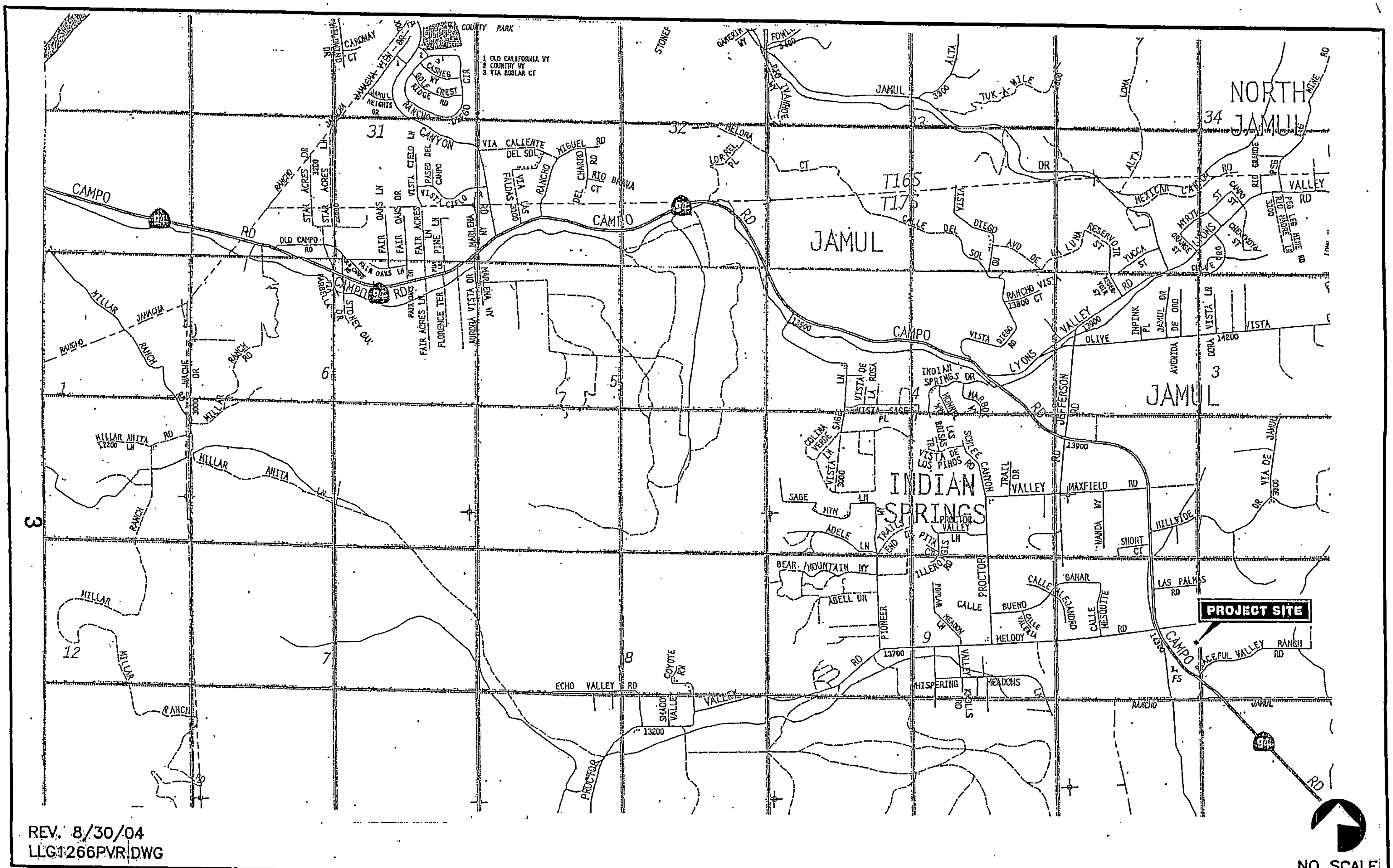

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Figure 2

PROJECT AREA MAP

PEACEFUL VALLEY RANCH

2.0 Project Description

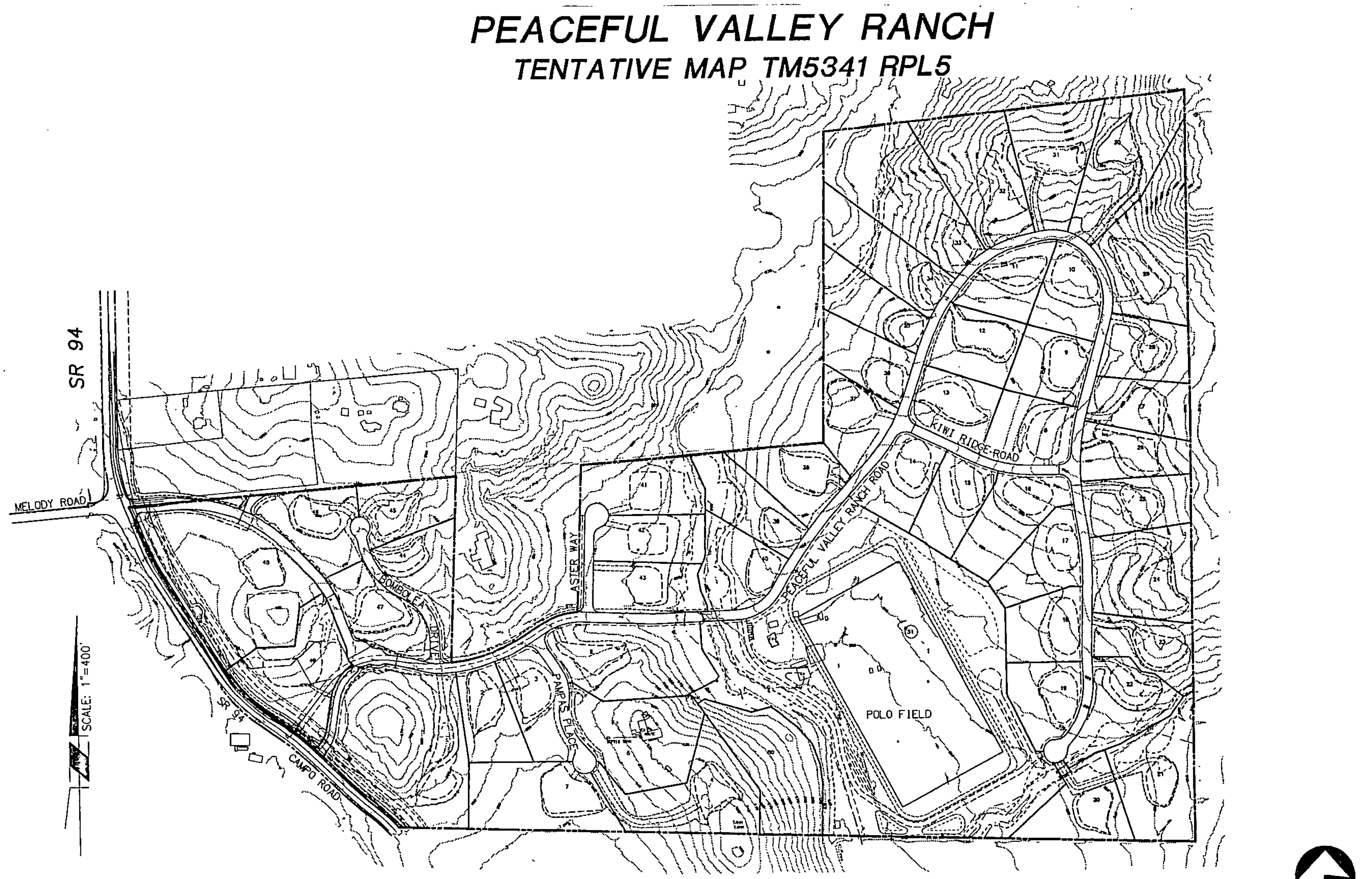
The Peaceful Valley Ranch project proposes the subdivision of 181.31-acres for an estate residential development, equestrian uses and amenities, and fire service facilities. The development plan includes a total of 57 lots consisting of:

a) 1 – estate residential lot of 4.0-acres for the existing Ranch House (Lot 5);
b) 46 new estate residential lots ranging in size from a minimum of 2-acres up to approximately 7.7 acres (Lots 1-4 and 6-47);
c) 1 - 6.7-acre equestrian facility lot (Lot 48);
d) 1 - 3.7-acre lot reserved for a new joint-use fire station and administrative offices of the RFPD and US Fish and Wildlife Service (Lot 49);
e) 1- 3.7-acre open space lot for the protection of biological resources (Lot 50);
f) 1 -28.9 acre private horse stable and training facilities / polo field lot (Lot 51); and,
g) 6 private roadway lots (Lots 52-57)

The proposed project requires the approval of a tentative map (TM 5341RPL[5]) by the County of San Diego.

The project also includes a General Plan Amendment (GPA) to amend the existing land use designation of the easterly 152.4-acres of the 181.31-acre property from (18) Multiple Rural Use (1 du/4,8,20 ac) with an A72 (8) General Agriculture zone, to the (17) Estate Residential (1 du/2, 4ac) designation with an A72 (2) General Agriculture zone. The General Plan Amendment covers APN's 597-050-13, 597-070-02, and 597-070-07. The GPA request also seeks removal of a segment of a County of San Diego Circulation Element Road, SC 760, which is currently aligned through the project site. SC 760 is a planned two-lane Light Collector Road. The segment of SC 760 proposed for removal with the project extends from SR 94 north to Olive Vista Drive. The project also includes the annexation of the 152.46 acres of the easterly portion of the site into the San Diego County Water Authority and Metropolitan Water District.

Figure 3 shows the conceptual tentative map.



SOURCE: RBF Consulting (08/2006)

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Figure 3

TENTATIVE MAP

PEACEFUL VALLEY RANCH

3.0 Existing Conditions

3.1 Existing Street System

According to the County of San Diego Public Road Standards, **Prime Arterials** should be 102 feet wide in 122 feet of Right-of-Way (R/W), providing six thru lanes, a raised median and curbside parking. **Major Roads** should be 78 feet wide in 98 feet of R/W, providing four thru lanes, a raised median and curbside parking. **Collectors** should be 64 feet wide in 84 feet of R/W providing four thru lanes with curbside parking or four thru lanes with a left-turn lane. **Light Collectors** should be 40 feet wide in 60 feet of R/W, providing two thru lanes with a left-turn lane. Bike lanes add 10 feet to both the road width and the R/W.

The following is a brief description of the existing street system in the project area. **Figure 4** shows an existing conditions diagram.

SR 94 is classified as a Prime Arterial north of Melody Road and a Major Road south of Melody Road on the County of San Diego Circulation Element. SR 94 is currently constructed as a two-lane undivided roadway providing one lane of travel per direction with a posted speed limit of 50 mph. Bike Lanes are currently not provided and curbside parking is prohibited along both sides of the roadway. Bus stops are provided intermittently along the roadway. SR 94 is part of the County of San Diego Bicycle Network System. SR 94 is approximately 26 feet wide with shoulders generally varying from 2 to 4 feet in the project area.

Steele Canyon Road is classified as a Collector Road in the County of San Diego Circulation Element. Steele Canyon Road is currently constructed as a two lane undivided roadway, providing one travel lane in the north direction and one travel lane in the south direction. Steele Canyon Road is signalized at SR 94. Steele Canyon Road has a roadway width of 45 feet with no shoulders provided. The posted speed limit on Steele Canyon Road is 45 mph.

Lyons Valley Road is a two-lane undivided roadway. Bike lanes are provided and curbside parking is prohibited. Lyons Valley Road has a current roadway width of 35 feet with no shoulders provided. The speed limit is posted at 45 MPH.

Jefferson Road is a two-lane undivided roadway with a posted speed limit of 40 MPH. Currently, Jefferson Road has a roadway width of 30 feet with no shoulders provided.

Melody Road is an unclassified roadway within the County of San Diego. Melody Road is currently constructed as a two-lane undivided roadway providing one lane of travel per direction. No bike lanes or bus stops are provided and curbside parking is prohibited. No speed limit was posted, so the prima facie speed is 25 mph. Currently, Melody Road has a roadway width of 40 feet with no shoulders provided.

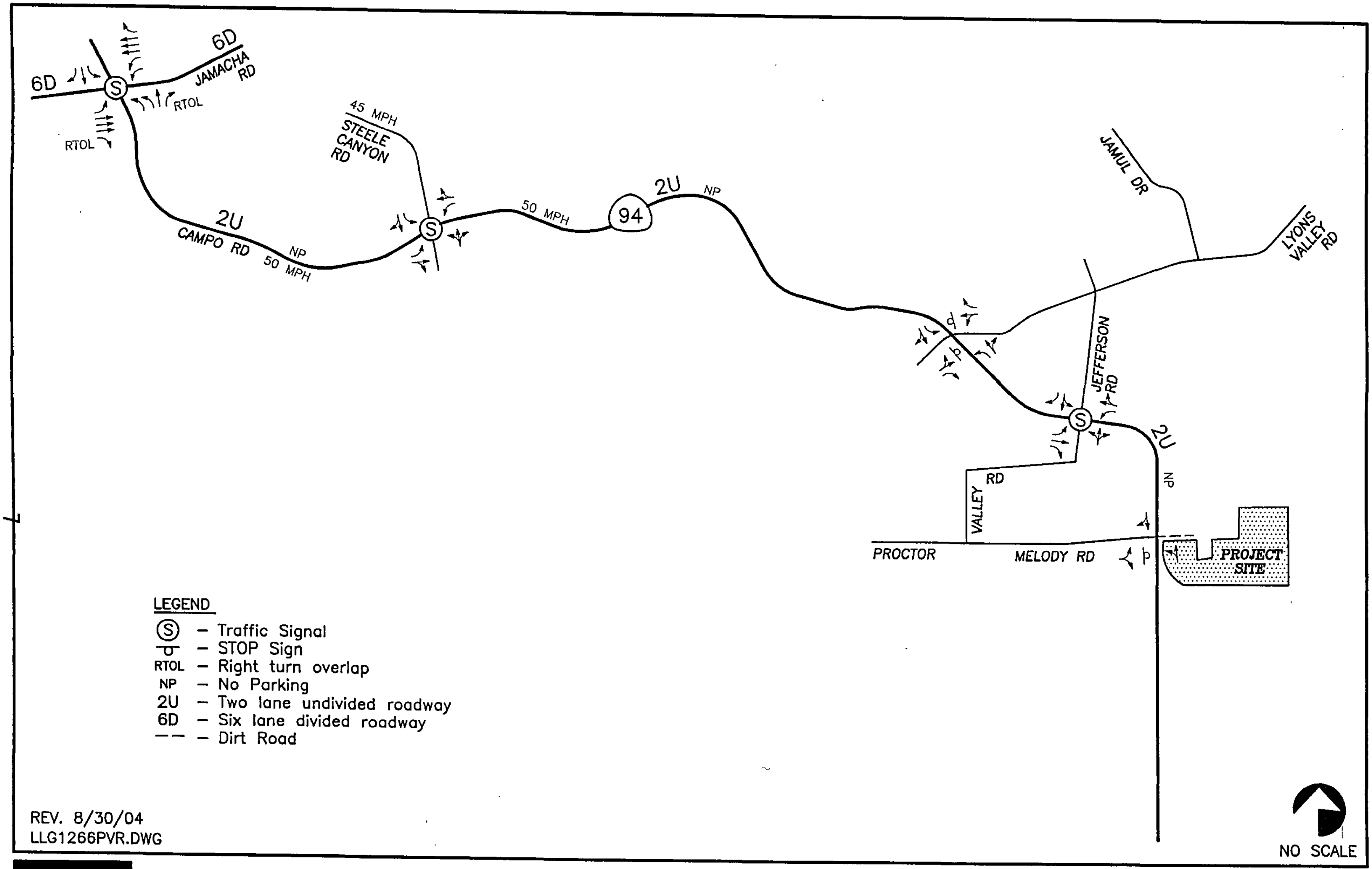

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Figure 4

EXISTING CONDITIONS DIAGRAM

PEACEFUL VALLEY RANCH

Peaceful Valley Ranch Road is an unclassified roadway within the County of San Diego. Peaceful Valley Ranch Road is currently constructed as a two-lane undivided roadway providing one lane of travel per direction. It should be noted that the existing Peaceful Valley Ranch Road is located approximately 500 feet to the south of the existing SR 94/Melody Road intersection. Once Peaceful Valley Ranch Road is ultimately relocated to the SR 94 / Melody Road intersection point of access with implementation of the project or the fire station development, the current access will be converted to an emergency use secondary access in a relocated location approximately 200 feet south of its current location, and will be controlled by the Rural Fire Protection District. Peaceful Valley Ranch Road will at all times remain a "private road."

3.2 Existing Traffic Volumes

Existing Average Daily Traffic (ADT) volumes and weekday intersection counts were obtained from the *Jamul Indian Village* traffic study completed by Katz Okitsu & Associates in November 2002. The ADT volumes are shown in **Table 1**. Weekday intersection counts were also obtained from the KOA report and were collected during the AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak hours in May 2002 at the following key intersections in the project area.

- SR 94 / Jamacha Road;
- SR 94 / Steele Canyon Road;
- SR 94 / Lyons Valley Road; and
- SR 94 / Jefferson Road; and
- SR 94 / Melody Road.

Figure 5 shows the ADT and AM/PM peak hour turning movement volumes at the key intersections. **Appendix A** contains the manual and street segment count sheets.

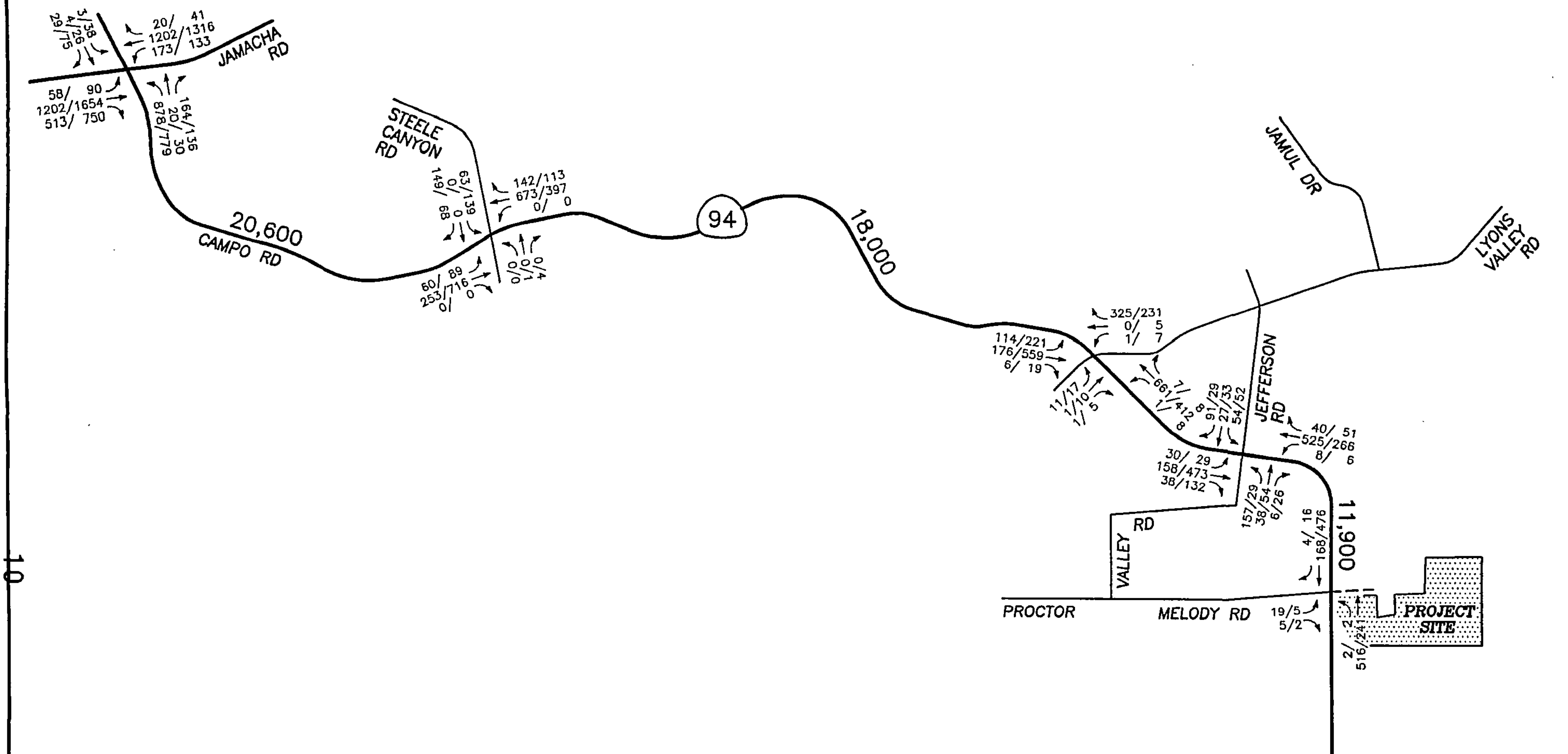
TABLE 1

EXISTING ADT

STREET SEGMENT	YEAR	ADT[1]
SR 94		
Jamacha Road to Steele Canyon Road	2002	20,600
Steele Canyon Road to Lyons Valley Road	2002	18,000
Lyons Valley Road to Melody Road	2002	11,900

SOURCE: *Caltrans State Highway Traffic Volumes website, 2002.*

Note:
1. ADT – Average Daily Traffic



NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

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Figure 5

EXISTING TRAFFIC VOLUMES AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH

4.0 Project Traffic

4.1 Project Traffic Generation

Trip generation estimates for the residential portion of the development were calculated based on SANDAG rates provided in the *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region, April 2002.* Project trips were calculated using the trip rate for single-family detached estate homes of 12.0 trips/ Dwelling Unit for the 47-new estate residential lots. It should be noted that subsequent to this iteration of the traffic report, the single-family portion of the project has been reduced from 47 to 46 dwelling units. The analysis reflects the more conservative 47 dwelling units. Trip generation for the equestrian facilities and the fire station were estimated based on the typical day-today use since SANDAG rates were not available. **Table 2** shows the total project is calculated to generate approximately 750 ADT with 43 inbound / 46 outbound trips during the AM peak hour and 56 inbound / 46 outbound trips during the PM peak hour.

TABLE 2
PROJECT TRIP GENERATION SUMMARY

LAND USE	SIZE	DAILY TRIP ENDS		AM PEAK HOUR TRIPS				PM PEAK HOUR TRIPS			
		RATE[1]	ADT	% of ADT	IN:OUT SPLIT	VOLUME IN	VOLUME OUT	% of ADT	IN:OUT SPLIT	VOLUME IN	VOLUME OUT
Single-Family Homes	47[2]	12.0 / DU[3]	564	8%	30:70	14	31	10%	70:30	39	17
Equestrian Facilities/ Private Horse Stables	-	-	50[4]	-	-	3	3	-	-	3	3
Fire Station[5]	-	-	133	-	-	26	12	-	-	14	26
TOTAL	-	-	**750[6]**			**43**	**46**			**56**	**46**

NOTES:
1 Rate Source except as noted: SANDAG Trip Generation Brief Guide (April, 2002).
2. The 47 units include 46 new residential lots and one existing estate residential lot.
3. DU – Dwelling Unit.
4. Estimated traffic generation based on typical day-to-day activity. SANDAG rates were not available.
5. Traffic generation obtained from a stand-alone traffic study prepared by LLG for the Fire Station (January, 2005).
6. Rounded total ADT

4.2 Project Traffic Distribution /Assignment

The generated project traffic was distributed and assigned to the street system based on project access, the characteristics of the roadway system, and the proximity of the project to employment, retail, and educational opportunities. The vast majority of project traffic is expected to be oriented to/from the north. The project distribution was completed assuming only the existing roadway network (i.e. no SC 760), which provides a worst-case distribution of traffic with the most limited roadway network. **Figure 6** depicts the estimated project traffic distribution in the site environs without SC 760. **Figure 6A** shows the estimated distribution of traffic if SC 760 was constructed. Project traffic was assigned to the surrounding circulation system based on the estimated distribution and is illustrated in **Figure 7**. **Figure 8** shows the existing + project traffic volumes.

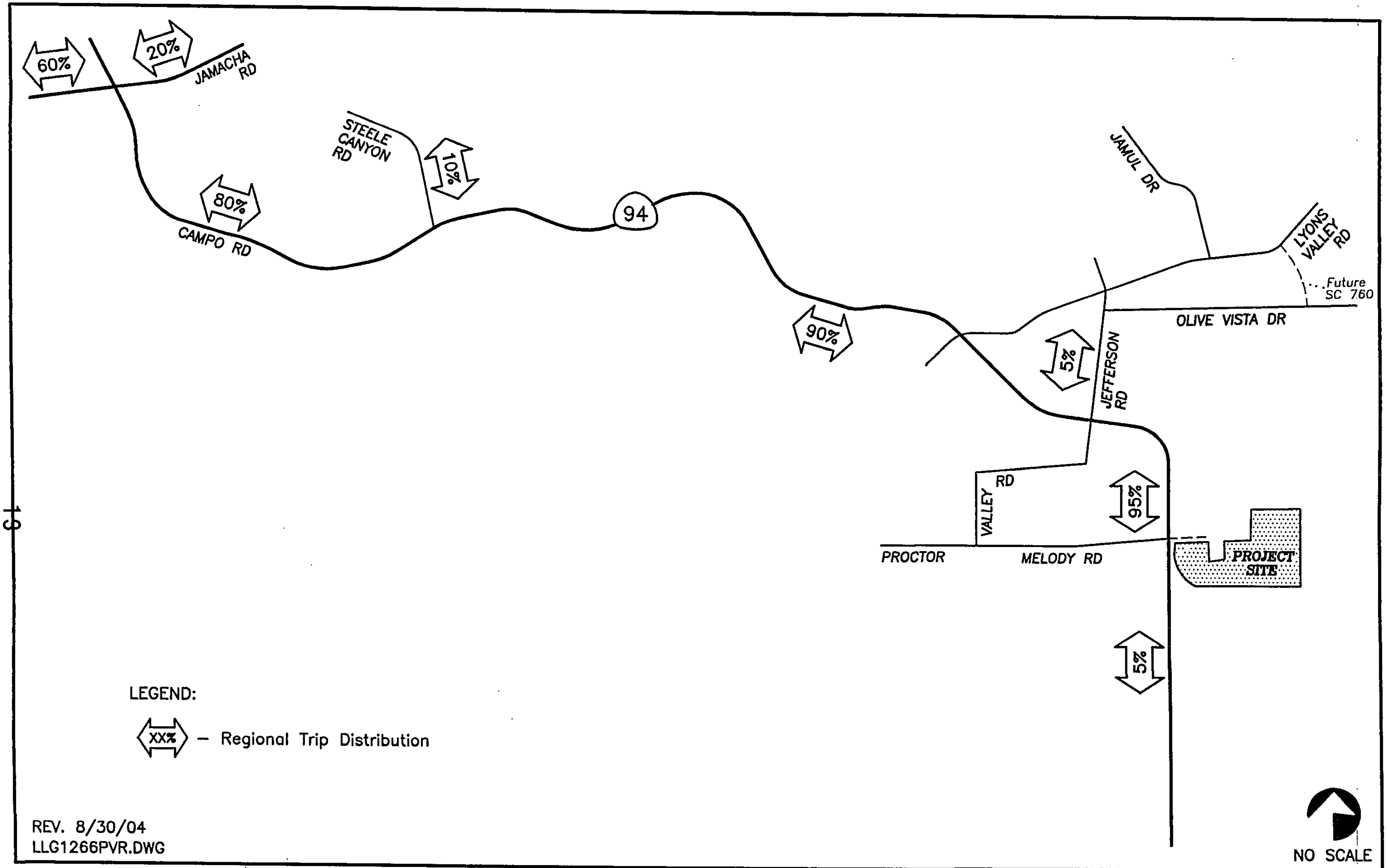

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Figure 6

REGIONAL TRAFFIC DISTRIBUTION WITHOUT THE FUTURE SC 760

PEACEFUL VALLEY RANCH

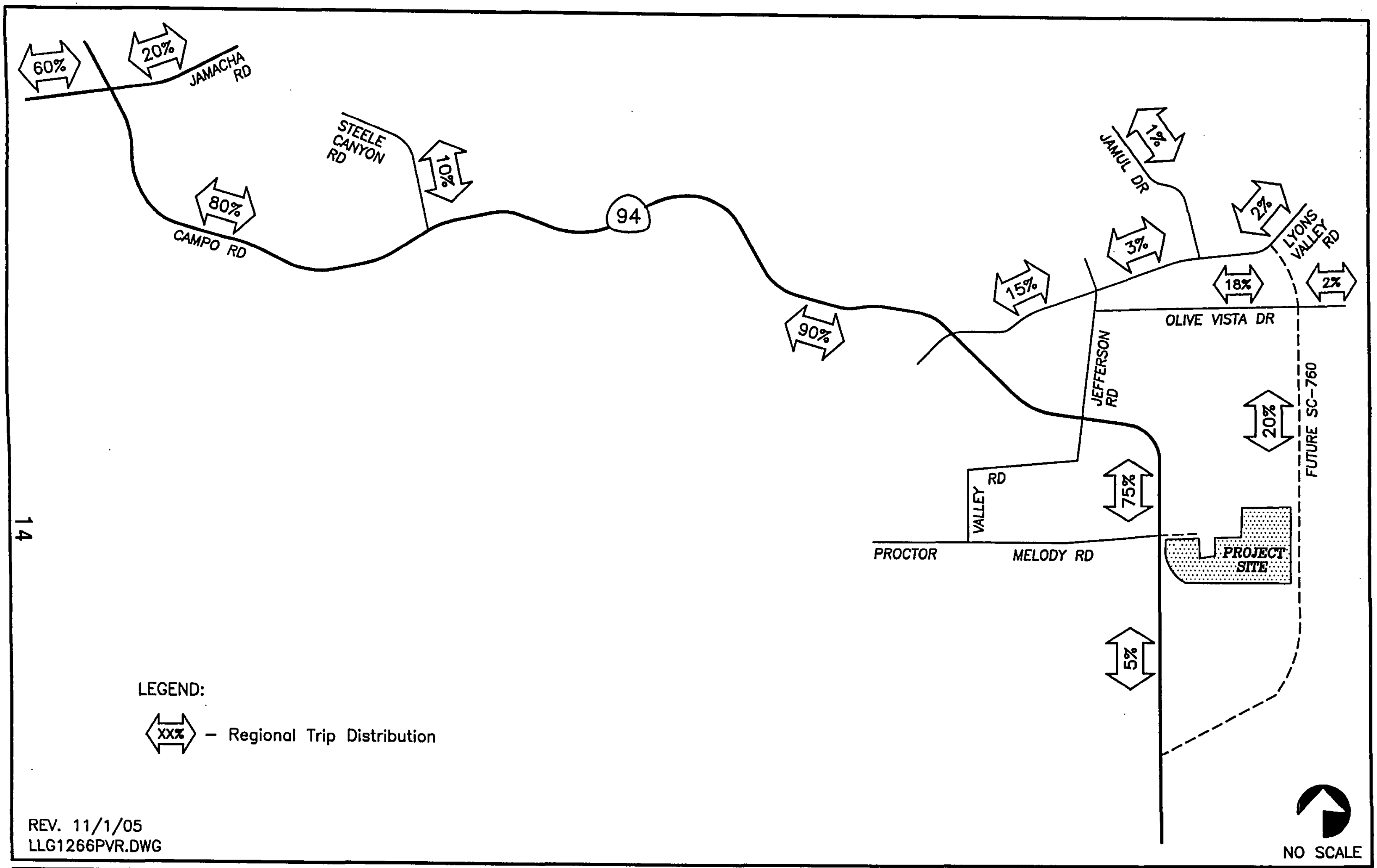

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Figure 6a

REGIONAL TRAFFIC DISTRIBUTION WITH SC 760

PEACEFUL VALLEY RANCH

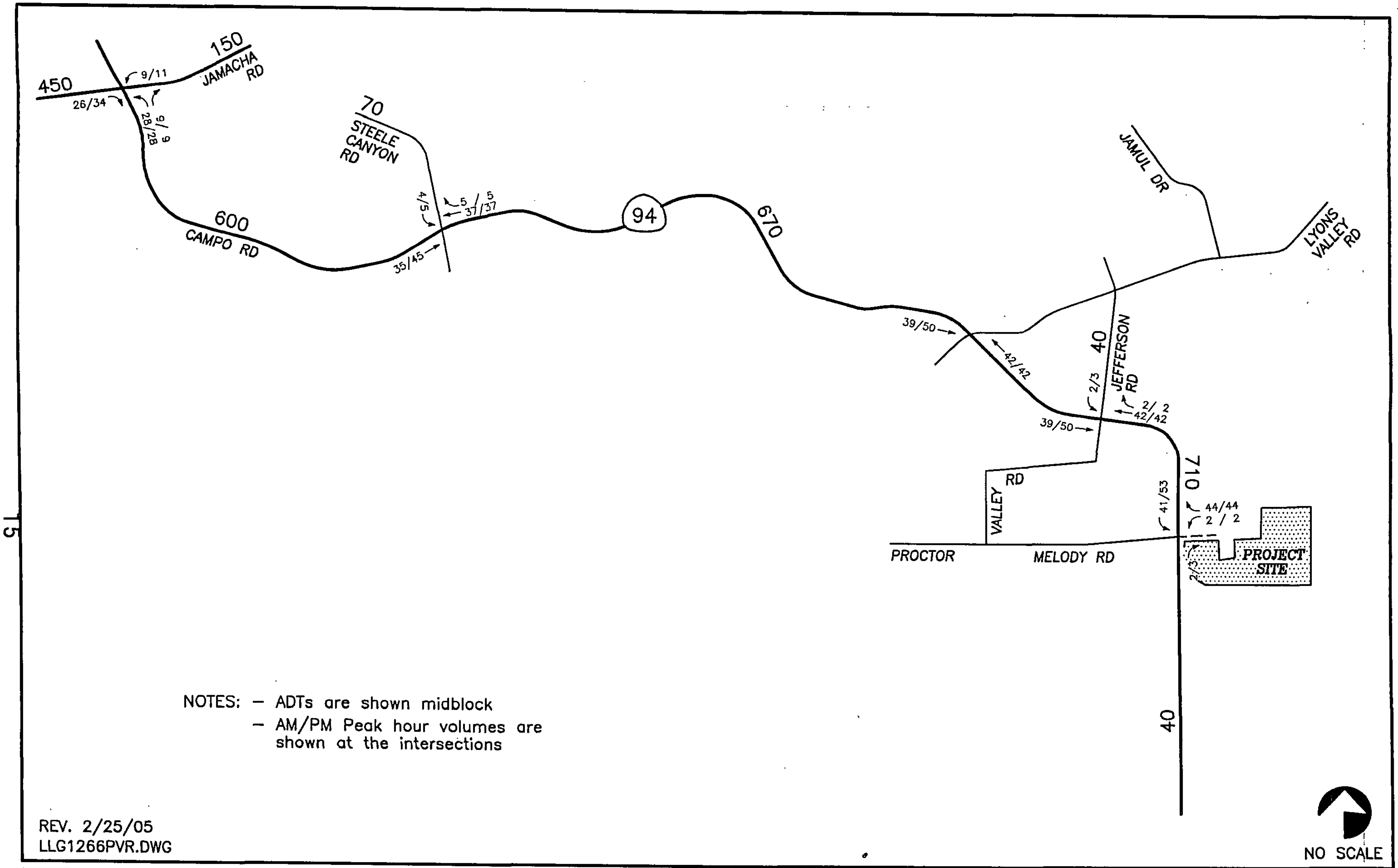

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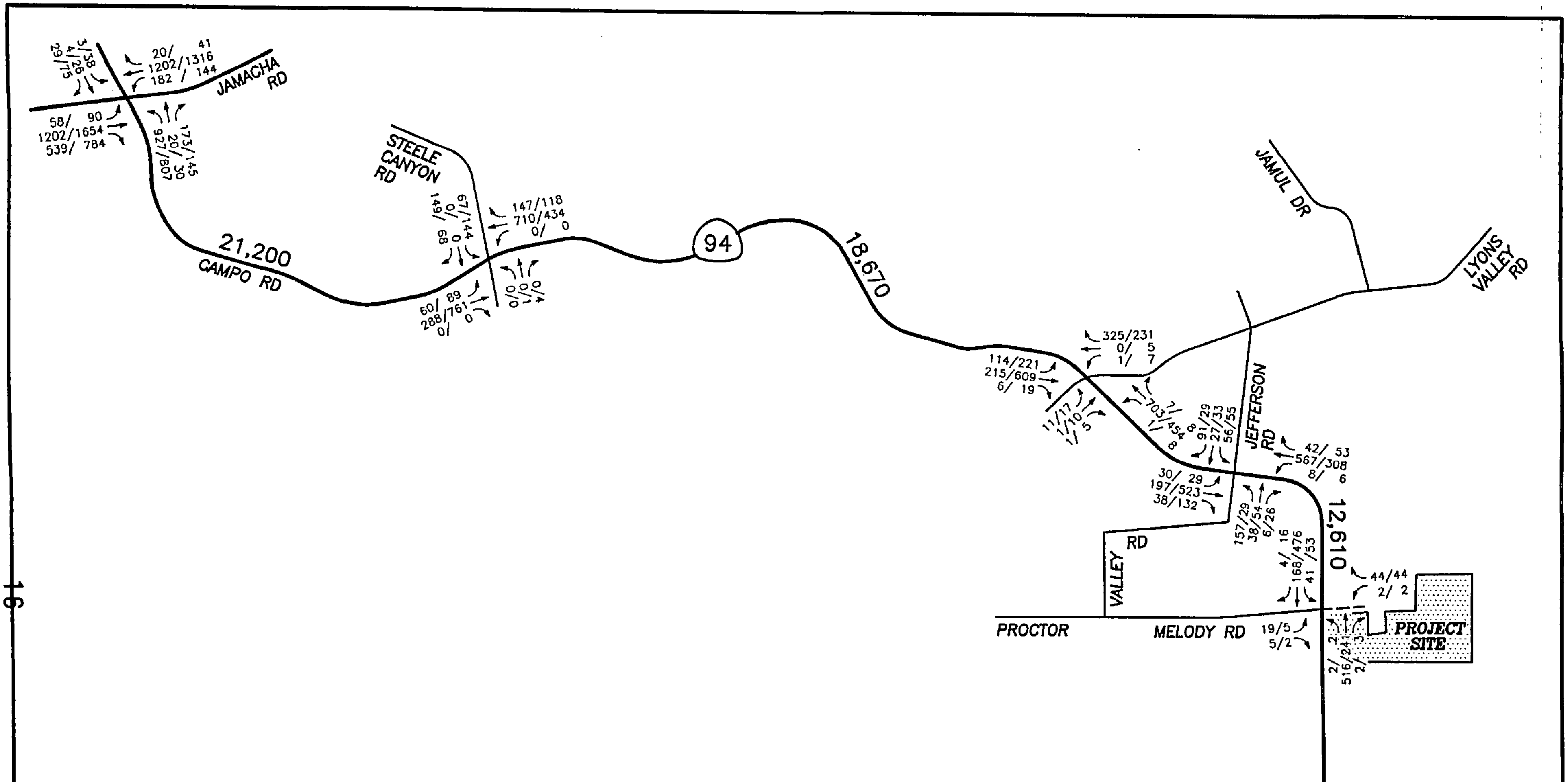
Figure 7

PROJECT TRAFFIC VOLUMES AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

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Figure 8

EXISTING + PROJECT TRAFFIC VOLUMES AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH

5.0 Cumulative Projects

There are other planned projects in the vicinity, which could potentially add traffic to the roadways and intersections in the study area. Based on research conducted at the County of San Diego Department of Planning and Land Use (DPLU) and previous traffic reports completed within the project vicinity, fourteen (14) cumulative development projects were identified for inclusion in this traffic study. In addition, to account for any future unforeseen projects, a 10% growth was added to the total cumulative project traffic volumes. The following is a brief description of each cumulative project.

1. **The Jamul Indian Village** is located at the southwest corner of Melody Drive and SR 94. The preferred project proposes to develop a two-story, 265,000 square foot gambling and entertainment facility, and a multi-story parking structure (2,600 spaces). The proposed project is calculated to generate 9,660 daily trip ends (ADT). Traffic data for this project was obtained from a draft traffic study prepared by Katz, Okitzu & Associates (KOA) on November 2002.

   A worst case Retail Alternative is discussed and analyzed in the KOA traffic study. This alternative would generate 37,000 ADT. The proposed casino project was included in the near-term cumulative analysis and both the proposed and worst-case project alternatives are included in the long-term (Year 2030) analysis.

2. **TPM 20550 (Morgan Minor Subdivision)** proposes to construct 2 single-family estate homes. The project site is proposed north of the Procter Valley Road/Poplar Meadow Lane intersection. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 24 ADT with 1-inbound/1 outbound trips during the AM peak hour and 1 inbound/1 outbound trips during the PM peak hour.

3. **TM 5154 RPL1 (Hendrix Subdivision)** is located east of Campo Road on Las Palmas Road. The project proposes to develop 5 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 60 ADT with 2 inbound/3 outbound trips during the AM peak hour and 4 inbound/2 outbound trips during the PM peak hour.

4. **TM 5213 RPL2 (Mintz Subdivision)** is located north of Skyline Truck Trail and east of Hidden Trail drive. The project proposes to develop approximately 25 acres of land into 10 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 120 ADT with 3 inbound/7 outbound trips during the AM peak hour and 8 inbound/4 outbound trips during the PM peak hour.

5. **TM 5289 RPL2 (Jamul Highlands Subdivision)** proposes to construct 25 single-family estate homes. The project site is proposed south of the Valley Road/Jamul Highlands Road intersection. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 300 ADT with 7 inbound/19 outbound trips during the AM peak hour and 21 inbound/9 outbound trips during the PM peak hour.

6. **TPM 20626 Development** proposes to construct 3 single-family estate homes. The project site is proposed on the west side of Procter Valley Road, just north of the Proctor Valley Road/Melody Road intersection. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 36 ADT with 1 inbound/2 outbound trips during the AM peak hour and 3 inbound/1 outbound trips during the PM peak hour.

7. **TPM 20628 RPL1 (Yacoo Minor Subdivision)** proposes to construct 4 single-family estate homes. The project site is proposed on Schlee Canyon Road north of Procter Valley Road. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 48 ADT with 1 inbound/3 outbound trips during the AM peak hour and 4 inbound/1 outbound trips during the PM peak hour.

8. **A Residential Development** is located just east of the proposed project and south of Olive Vista Drive. The project proposes to develop 20 single-family estate homes. The project is calculated to generate 240 ADT with 6 inbound/13 outbound trips during the AM peak hour and 17 inbound/7 outbound trips during the PM peak hour.

9. **TPM 20599 RPL1 (Blanco Parcel Map)** proposes to construct 4 single-family estate homes. The project site is proposed on the east side of SR 94, north of the Melody Road. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for Estate homes. The project is calculated to generate 48 ADT with 1inbound/3 outbound trips during the AM peak hour and 4 inbound/1 outbound trips during the PM peak hour.

10. **TPM 20868 (Steinbarth Minor Subdivision)** is located just north of the proposed project and south of Olive Vista Drive. The project proposes to develop 2 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 24 ADT with 1 inbound/1 outbound trips during the AM peak hour and 1 inbound/1 outbound trips during the PM peak hour.

11. **TPM 20594 (Pioneer Minor Subdivision)** is located just west of the proposed project and north of Melody Lane. The project proposes to develop 3 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 36 ADT with 1 inbound/2 outbound trips during the AM peak hour and 3 inbound/1 outbound trips during the PM peak hour.

12. **Otay Ranch – Village 19** is located south west of the proposed project and south of Melody Lane. The project proposes to develop 20 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 240 ADT with 6 inbound/13 outbound trips during the AM peak hour and 17 inbound/7 outbound trips during the PM peak hour.

13. **Jamul Estates II** is located just north east of the proposed project. The maximum allowable developable lots are 68 single-family estate homes based on the current zoning. Therefore, the project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 816 ADT with 20 inbound/46 outbound trips during the AM peak hour and 57 inbound/24 outbound trips during the PM peak hour.

14. **Simpson Farms** is generally located on the northeast corner of the SR 94 (Campo Road)/Jefferson Road intersection in the Jamul Community of San Diego County. The project proposes to develop 98 single-family estate homes and 115,000 square feet (sf) of commercial uses. The project was calculated to generate approximately 6,500 ADT with approximately 124 inbound/130 outbound trips during the AM peak hour and 323 inbound/275 outbound trips during the PM peak hour.

Appendix B contains the individual assignments for each cumulative project. **Figure 9** shows the total assignment of cumulative project traffic including the 10% growth factor. **Figure 10** shows the existing + project + cumulative projects traffic volumes.

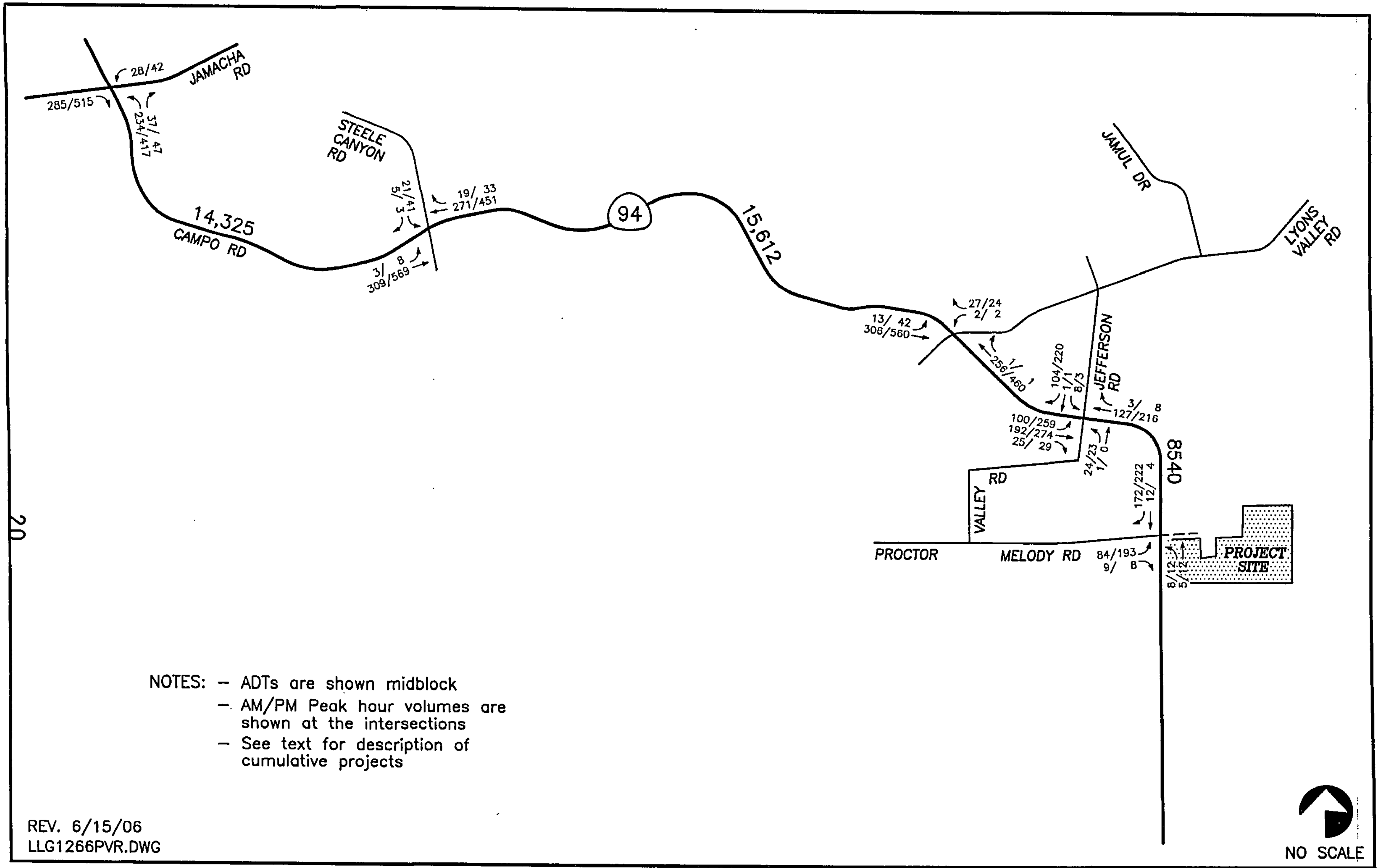

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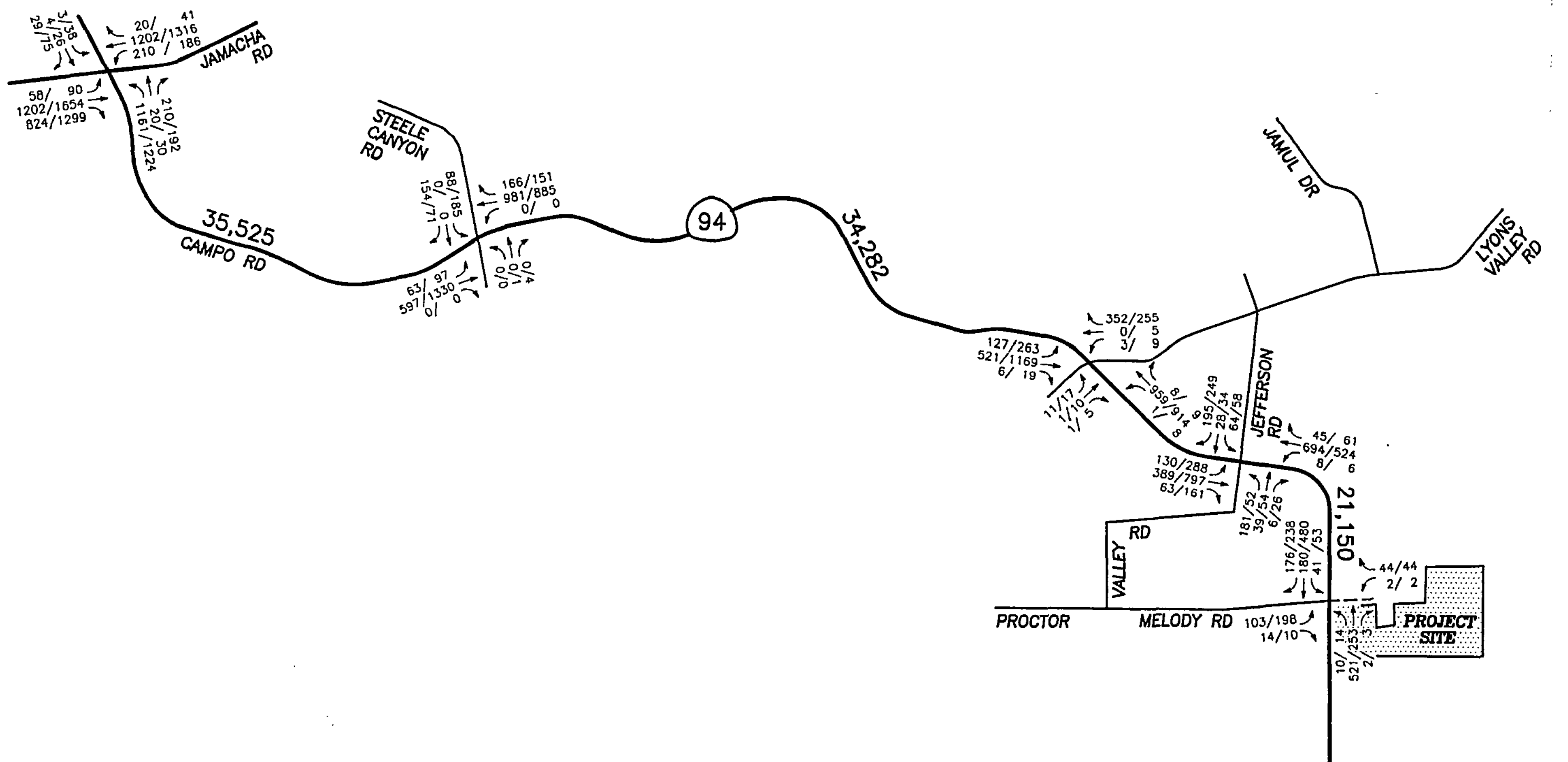
Figure 9

CUMULATIVE PROJECTS TRAFFIC VOLUMES AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

NO SCALE

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Figure 10

EXISTING + PROJECT + CUMULATIVE PROJECTS TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH

6.0 Significance Criteria

The Public Facility Element of the County General Plan, together with relevant portions of CEQA Guidelines (**Appendix C**), as well as the County of San Diego Significance Thresholds, were used as criteria for determining significant impacts. The Public Facilities Element provides the fundamental County standards for acceptable traffic Levels of Service (LOS), as follows:

> A significant cumulative impact would occur if the project, in combination with reasonably foreseeable past, present, and future projects, would either: (a) reduce the level of service to below LOS 'D' on off-site and on-site abutting intersections or segments of Circulation Element roads, or (b) significantly impact congestion on such roads that are currently operating at a level of service of LOS 'E' or 'F'.

The County has prepared a document to provide guidance as to whether or not a project would significantly impact congestion under the above described circumstances. In general, if project-only traffic impacts exceed the criteria given below, then the impacts are determined to be a direct significant impact. If the project, together with other cumulative projects, exceeds the criteria, then the impact is determined to be a cumulative significant impact. A list of cumulative projects considered for the cumulative traffic analysis is provided and described in Section 5.0 Cumulative Projects of this report.

The table below was used to determine if impacts were significant.

Measures of Significant Project Impacts to Congestion Allowable Increases on Congested Roads and Intersections			
Road Segment			
	2-Lane Road	4-Lane Road	6-Lane Road
LOS E	200 ADT	400 ADT	600 ADT
LOS F	100 ADT	200 ADT	300 ADT
Intersections			
	Signalized	Unsignalized	
LOS D	---	20 peak-hour trips on a critical movement	
LOS E	Delay of 2 seconds	20 peak-hour trips on a critical movement	
LOS F	Delay of 1 second, or 5 peak-hour trips on a critical movement	5 peak-hour trips on a critical movement	

In addition, a significant impact would occur if, based upon an evaluation of existing accident rates, the signal priority list, intersection geometrics, proximity of adjacent driveways, sight distance or other factors, it is found that the generation is less than those specified above and would significantly impact the operations of the intersection.

In addition, for purposes of evaluating impacts in this report, a significant impact would occur if the proposed project would:

- Increase hazards due to design features (e.g., sharp curves or dangerous intersections, or inadequate emergency access); or,

- Result in inadequate parking capacity; or,

- Create a hazard or barrier for pedestrians and bicyclists; or,

- Conflicts with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

7.0 Traffic Analysis Methodology

Level of Service (LOS) is the term used to denote the different operating conditions which occur on a given roadway segment under various traffic volume loads. It is a qualitative measure of the effect of a number of factors including roadway geometries, speed, travel delay, freedom to maneuver, and safety. Level of Service provides an index to the operational qualities of a roadway segment or an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. Level of Service designation is reported differently for signalized and unsignalized intersections, as well as for roadway segments.

7.1 Signalized Intersections

The signalized intersections were analyzed under morning and afternoon peak hour conditions. Average vehicle delay was determined utilizing the methodology found in Chapter 16 of the *2000 Highway Capacity Manual (HCM),* with the assistance of the *Traffix* (version 7.7) computer software. The delay values (represented in seconds) were qualified with a corresponding intersection Level of Service (LOS). In addition, Intersecting Lane Volume (ILV) analysis for signalized intersections at Caltrans facilities were conducted per Caltrans methodologies. **Table 3a** shows the intersection operations. **Appendix D** contains the intersection operation analysis worksheets.

TABLE 3a
INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing		Existing + Project		Δ[d]	Existing + Project + Cumulative Projects		Impact Type
			Delay[a]	LOS[b]	Delay	LOS		Delay	LOS	
SR 94 / Jamacha Road	SIGNAL[a]	AM	25.1	C	25.8	C	-	27.3	C	None
		PM	26.6	C	27.3	C	-	52.8	D	
SR 94 / Steele Canyon Road	SIGNAL[a]	AM	14.7	B	14.9	B	-	18.0	B	None
		PM	14.1	B	14.3	B	-	45.1	D	
SR 94 / Lyons Valley Road	TWSC[c]	AM	> 50.1	F	> 50.1	F[e]	0	**> 50.1**	**F**	Cumulative
		PM	> 50.1	F	> 50.1	F[e]	0	**> 50.1**	**F**	
SR 94 / Jefferson Road	SIGNAL[a]	AM	21.0	C	23.6	C	2	52.7	D	None
		PM	15.1	B	15.5	B	3	46.8	D	
SR 94 / Melody Road	TWSC[c]	AM	13.9	B	18.9	C	2	**43.0** *20.2* 12.6	**E** *C[f]* B[g]	Cumulative
		PM	14.2	B	18.7	C	2	**> 50.1** *23.9* 14.6	**F** *C[f]* B[g]	

Notes:
a. Delay – Average delay expressed in seconds per vehicle.
b. LOS – Level of Service.
c. TWSC – Two Way Stop Controlled Intersection. Average delay expressed in seconds per vehicle and represents the worse case minor street movement.
d. Project traffic added to critical movement for unsignalized intersections operating at LOS E or F only.
e. Project adds less than 5 peak hour trips to the critical movement. Therefore, the impact is cumulative.
f. *LOS without Jamul Casino cumulative traffic added.*
g. LOS with traffic signal mitigation.

Shading and bold typeface represents a significant impact.

SIGNALIZED		UNSIGNALIZED	
DELAY/LOS THRESHOLDS		DELAY/LOS THRESHOLDS	
Delay	LOS	Delay	LOS
0.0 < 10.0	A	0.0 < 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
> 80.1	F	> 50.1	F

7.2 Intersection Lane Vehicles Analysis

The State-owned intersections (intersections along SR 94) were analyzed using the Intersecting Lane Vehicles (ILV) methodology as described in Chapter 400, Topic 406 of the Department Highway Design Manual, The ILV methodology is based on the concept that capacity of intersecting lanes of traffic is 1,500 vehicles per hour. For the typical local street interchange there is usually a critical intersection of a ramp and the crossroads that establishes the capacity of the interchange. Listed below are the values of ILV/hr for various traffic flow conditions:

- *UNDER* - ILV/hr < 1200:
  Description: Stable flow with slight, but acceptable delay. Occasional signal loading may develop. Free mid-block operations.

- *NEAR* - ILV/hr 1200 – 1500:
  Description: Unstable flow with considerable delays possible. Some vehicles occasionally wait two or more cycles to pass through the intersection. Continuous backup occurs at some approaches.

- *OVER* - ILV/hr >1500:
  Description: Stop and go operation with severe delay and heavy congestion[1]. Traffic volume is limited by maximum discharge rates of each phase. Continuous backup in varying degrees occurs on all approaches. Where downstream capacity is restrictive, mainline congestion can impede orderly discharge through the intersection.

Note:
The amount of congestion depends on how much the ILV/hr value exceeds 1500. Observed flow rates will normally not exceed 1500 ILV/hr and the excess will be delayed in a queue.

Table 3b shows the Intersecting Lane Volume (ILV) analysis for the signalized intersections. **Appendix E** contains the intersection ILV analysis worksheets.

TABLE 3b
SIGNALIZED INTERSECTION OPERATIONS
ILV METHODOLOGY

Intersection	Peak Hour	Existing		Existing + Project		Existing + Project + Cumulative Projects	
		ILV[1]	STATUS	ILV	STATUS	ILV	STATUS
SR 94 / Jamacha Rd.	AM	1,328	Near Capacity	1,339	Near Capacity	1,470	Near Capacity
	PM	1,107	Under	1,114	Under	1,464	Near Capacity
SR 94 / Steele Canyon Rd.	AM	1,024	Under	1,066	Under	1,368	Near Capacity
	PM	860	Under	910	Under	1,520	Over Capacity
SR 94 / Jefferson Rd.	AM	887	Under	931	Under	1,170	Under
	PM	673	Under	726	Under	1,240	Under

Notes:
1. ILV – Intersection Lane Volume

STATUS

≤ 1,200 ILV/HR	UNDER CAPACITY
>1,200 but ≤ 1,500 ILV/HR	NEAR CAPACITY
> 1,500 ILV/HR	OVER CAPACITY

7.3 Unsignalized Intersections

The unsignalized intersections were analyzed under morning and afternoon peak hour conditions. Average vehicle delay and Levels of Service (LOS) was determined based upon the procedures found in Chapter 17 of the *2000 Highway Capacity Manual (HCM),* with the assistance of the *Traffix* (version 7.5) computer software. Appendix D contains the unsignalized intersection calculation sheets.

7.4 Street Segments

Street segment analysis is based upon the comparison of daily traffic volumes (ADT) to the County of San Diego's *Roadway Classification and Level of Service Tables*. This table provides segment capacities for different street classifications, based on traffic volumes and roadway characteristics. The County of San Diego's *Roadway Classification and Level of Service Table* is attached in **Appendix F**. **Table 4** shows the near-term street segment operations for the roadways within the project area.

7.5 Two-Lane Highway Analysis

The SR 94 segments were analyzed by determining the average speed and Level of Service in the peak direction during the AM and PM peak hours using the methodology outlined in Chapter 12 of the 2000 HCM. This methodology is approved by Caltrans. This analysis is used in conjunction with the street segment analysis described above to analyze the two-lane sections of SR 94 in the project area. **Table 4a** summarizes the near-term Two-Lane highway analysis of SR 94 in the study area. **Appendix G** contains the Two-Lane Highway analysis worksheets.

TABLE 4

STREET SEGMENT OPERATIONS

Street Segment	Existing Capacity (LOS E)[a]	Existing		Existing + Project		Δ[e]	Existing + Project + Cumulative Projects		Impact Type
		ADT[b]	LOS[d]	ADT	LOS		ADT	LOS	
SR 94									
Jamacha Rd. to Steele Canyon Rd.	16,200	20,600	F	**21,200**	**F**	**600**	35,525	F	Direct
Steele Canyon Rd. to Lyons Valley Rd.	16,200	18,000	F	**18,670**	**F**	**670**	34,282	F	Direct
Lyons Valley Rd. to Melody Rd.	16,200	11,900	E	**12,610**	**F**	**710**	21,150	F	Direct

Notes:

a. Capacity based on the San Diego County Street Classification Table.
b. ADT – Average Daily Traffic.
c. V/C – Volume/Capacity ratio.
d. LOS – Level of Service.
e. Δ denotes traffic volume increase due to project.

Shading and bold typeface represents a significant impact.

TABLE 4a

SR 94 TWO-LANE HIGHWAY ANALYSIS NEAR-TERM (WITH EXISTING NETWORK)

Street Segment	Peak Hour	Existing	Existing + Project	Δ Project ADT Increase	Significant?	Existing + Project + Cumulative Projects
		LOS	LOS			LOS
Jamacha Rd. to Steele Canyon Rd.	AM	E	**E**	**600**	**Yes**	E
	PM	E	**E**	**600**	**Yes**	E
Steele Canyon Rd. to Lyons Valley Rd.	AM	D	**D**	**670**	**Yes**	E
	PM	D	**D**	**670**	**Yes**	E
Lyons Valley Rd. to Jefferson Rd.	AM	C	C	670	No	D
	PM	C	C	670	No	D
Jefferson Rd. to Melody Rd.	AM	C	C	710	No	D
	PM	C	C	710	No	D

Note:

Shading and bold typeface represents a significant impact.

8.0 Near-Term Analysis

8.1 Existing Operations

8.1.1 Intersections

Table 3a shows a summary of the existing operations at the key intersections in the project area. This table shows that the majority of the key intersections are currently operating at LOS C or better during both the AM and PM peak hours. One exception is the minor street movement at the intersection of SR 94/Lyons Valley Road, which is calculated to currently operate at LOS F during both the AM and PM peak hours.

8.1.2 ILV Analysis

Table 3b summarizes the existing ILV operations at the key intersections along SR 94 in the project area. As seen in Table 3b, the SR 94/Jamacha Road intersection currently operates near capacity in the AM and under capacity in the PM. The SR 94/Steele Canyon Road and SR 94/Jefferson Road intersections currently operate under capacity in both the AM and PM peak hours.

8.1.3 Street Segments

Table 4 shows a summary of the existing street segment operations on SR 94 within the project vicinity. As shown on Table 4, SR 94 is currently operating at LOS E and F on a daily basis for all segments from Jamacha Road to Melody Road.

8.1.4 Two Lane Highway Analysis

Table 4a summarizes the existing Two-Lane Highway operations along SR 94 in the project area. As seen in Table 4a, all segments of SR 94 except one our currently operating at LOS D or better during both the AM and PM peak hours. The SR 94 segment between Jamacha Road and Steele Canyon Road currently operates at LOS E during the AM and PM peak hours.

8.2 Existing + Project Operations

8.2.1 Intersections

Table 3a shows that with the addition of project traffic, the majority of the key intersections are calculated to continue to operate at LOS C or better during both the AM and PM peak hours. The minor street movement at the intersection of SR 94/Lyons Valley Road is calculated to continue to operate at LOS F during both the AM and PM peak hours.

8.2.2 ILV Analysis

Table 3b summarizes the ILV operations at the key intersections along SR 94 in the project area for the existing + project condition. As seen in Table 3b, with the addition of project traffic, the SR 94/Jefferson Road and the SR 94/Steele Canyon Road intersections are calculated to continue to operate under capacity. The SR 94/Jamacha Road intersection is calculated to continue to operate near capacity in the AM and under capacity in the PM peak hour.

8.2.3 Street Segments

Table 4 shows a summary of the street segment operations within the project vicinity with the addition of project traffic. As shown on Table 4, SR 94 is calculated to continue to operate at LOS E and F for all segments from Jamacha Road to Melody Road.

8.2.4 Two Lane Highway Analysis

Table 4a summarizes the Two-Lane Highway operations along SR 94 in the project area for the existing + project condition. As seen in Table 4a, with the addition of project traffic, all segments of SR 94 except one are calculated to operate at LOS D or better during both, the AM and PM peak hours. The segment of SR 94 between Jamacha Road and Steele Canyon Road is calculated to continue to operate at LOS E during the AM and PM peak hours.

8.3 Existing + Project + Cumulative Projects Operations

8.3.1 Intersections

Table 3a shows that with the addition of cumulative project traffic, the majority of the key intersections are calculated to operate at LOS D or better during both the AM and PM peak hours. The minor street movements at the following two intersections are calculated to operate at below LOS D conditions.

- SR 94 / Lyons Valley Road (LOS F – AM/PM Peak Hours); and
- SR 94 / Melody Road (LOS E / F – AM / PM Peak Hours).

It should be noted that without the Jamul Casino added as a cumulative project, the intersection of SR 94/Melody Road is calculated to operate at an acceptable LOS C during both the AM and PM peak hours.

8.3.2 ILV Analysis

Table 3b summarizes the ILV operations at the key intersections along SR 94 in the project area for the existing + project + cumulative projects condition. As seen in Table 3b, with the addition of cumulative projects traffic, the SR 94/Jefferson Road intersection is calculated to continue to operate under capacity in both the AM and PM peak hours. The SR 94/Steele Canyon Road intersection is calculated to operate near capacity during the AM peak hour and over capacity during the PM peak hour. The SR 94/Jamacha Road intersection is calculated to operate near capacity in both the AM and PM peak hours.

8.3.3 Street Segments

Table 4 shows a summary of the street segment operations within the project vicinity with the addition of cumulative project traffic. As shown on Table 4, SR 94 is calculated to continue to operate at LOS F for all segments from Jamacha Road to Melody Road.

8.3.4 Two Lane Highway Analysis

Table 4a summarizes the Two-Lane Highway operations along SR 94 in the project area for the existing + project + cumulative projects condition. As seen in Table 4a, with the addition of cumulative projects traffic, all segments of SR 94 with the exception of two segments are calculated to operate at LOS D or better during both, the AM and PM peak hours. The segment of SR 94 between Jamacha Road and Steele Canyon Road is calculated to continue to operate at LOS E during the AM and PM peak hours. Additionally, the segment between Steele Canyon Road and Lyons Valley Road is calculated to operate at LOS E during both the AM and PM peak hours.

9.0 On-Site Traffic Circulation, Sight Distance And Other Issues

9.1 On-Site Traffic Circulation

The project proposes to provide a network of on-site roadways to access the residential units. A preliminary review of the proposed roadway network indicates adequate access and circulation. These on-site roadways are built to County standards.

9.2 Sight Distance

RBF Consulting prepared a Sight Distance Study/Conceptual Striping plan along SR 94 (Campo Road) at the Melody Road/Peaceful Valley Ranch Road. **Appendix H** contains the Sight Distance Study/Conceptual Striping plan.

9.3 Gated Access

The project is proposing a gated main entrance. Consent from other parties has been granted and a letter addressing this issue will be provided under separate cover. The design of the gated entrance shall be in conformance with San Diego County Design standards No. DS-17, DS-18 or DS-19, and to the satisfaction of the Director of Public Works.

9.4 Emergency Access

Secondary access for emergencies is being provided via a 24-foot wide paved access road from Peaceful Valley Ranch Road to SR 94 south of and adjacent to the fire station site. This access shall be gated and locked under control of the San Diego Rural Fire Protection District, and shall be used for emergency purposes only.

9.5 Preserving The SC 760 Corridor Between Olive Vista Drive and SR 94 as a Non-Circulating Element Public Road

The feasibility of preserving the SC 760 corridor between Olive Vista Drive and SR 94 as non-circulation element public road was assessed and it was determined that it would not be feasible for the following environmental reasons. It is not proposed to delete SC 760 between Lyons Valley Road and Olive Vista Drive from the Circulation Element, as discussed in Section 10.0 of this report.

- First, the property to the south of the Peaceful Valley Ranch property is dedicated open space controlled by the State Department of Fish and Game. Therefore, the road's ultimate connection to SR-94 anywhere south of the site is highly unlikely as it would have to traverse the middle of this dedicated biological open space owned by the State Department of Fish and Game, thereby requiring the unlikely consent of that agency. Without the connection to SR 94, the functionality of the road is substantially diminished.

- Second, the SC 760 corridor is aligned along the natural drainage channel of Jamul Creek. Substantial adverse environmental effects would result from constructing the road. The topography of the area varies and it would be costly to realign the road to avoid the many creek crossings. Additionally, the wetland mitigation involved would be costly as well.

- Thirdly, the Jamul / Dulzura Community Planning Group has expressed its desire not to have a public road connection along the SC 760 alignment in this area.

10.0 Assessment of Access Issues Associated with the Deletion of a Portion of SC 760 from Olive Vista Drive to SR 94

The Peaceful Valley Ranch ("PVR") General Plan Amendment proposes, among other General Plan modifications, the deletion of a segment of a circulation element road from the County's Circulation Element of the General Plan. The road has not been constructed and its proposed future alignment is designated within the Circulation Element as SC 760. The road is locally known as Jamul Creek Road. The segment of SC 760 proposed for deletion extends from Olive Vista Drive in the north to SR-94 in the south. This traffic impact analysis evaluates the potential impacts associated with the redistribution of future traffic volumes within the regional roadway network, and potential impacts relating to the elimination of access opportunities to properties along the SC 760 adopted corridor alignment. The potential impacts relating to the redistribution of traffic within the regional roadway network are analyzed in this report. The following discussion provides an analysis of the potential impacts relating to the elimination of access opportunities to properties along the SC 760 corridor alignment.

In order to assess the potential property access issues along the SC 760 corridor, individual property ownerships were identified and, together with both previously approved and currently proposed subdivisions were mapped on a regional map of the corridor. This map is included as **Appendix I** of this report. A review of that mapping reveals that the properties along that segment of the SC 760 corridor from Olive Vista Drive to SR-94 can be viewed as grouped in 6 general ownership categories or areas from north to south as follows:

Area 1 – From Alta Vista Drive south approximately ¼ section to the current cul-de-sac end of Miramontes Rd;
Area 2 – From the current cul-de-sac end of Miramontes Rd. approximately 850 feet to the northern boundary of PM 6352;
Area 3 – From the northern boundary of PM 6352 approximately 2,000 feet to the southern boundary of PM 6452 at the northeast corner of the Peaceful Valley Ranch property;
Area 4 – From the southern boundary of PM 6352 approximately 1,300 feet immediately west of and adjacent to the northern portion of the PVR property to an inside corner of PVR property;
Area 5 – From the inside corner of the PVR property to the southern boundary of the PVR property;
Area 6 – From the southern boundary of the PVR property to SR-94.

<u>Area 1 (Multiple Ownerships)</u>: This is an area of previously subdivided parcels which now consist of a total of 8 parcels along the corridor alignment generally ranging from approximately 2-acres to 6-acres in size. These parcels currently take access from Miramontes Road, a private street. Virtually all of these parcels have now been improved with single-family detached homes and other site improvements. Right-of-way for SC 760 was <u>not</u> dedicated with the recording of the subdivision map for this area, except for a small portion immediately south of and adjacent to

Olive Vista Drive associated with PM 8664. Given the current property ownership structure, minimum existing parcel sizes, neighborhood character, level of property improvements, and current improved access, acquisition of the right-of-way is considered infeasible in the absence of condemnation. Additionally, none of these parcels rely on SC 760 for access, nor would they rely on SC 760 if further subdivided.

Area 2 (Kirchman Property): This area consists of approximately 25 acres, subdivided in 2001 into 3 parcels pursuant to a Certificate of Compliance #C00-0262BA(C)1. All 3 parcels take access from private roads connecting to Hillside Drive and do not rely on SC 760 for access. Furthermore, no dedication, or irrevocable offer of dedication, of the SC 760 right-of-way was required or granted at the time of the subdivision recordation. Additionally, the existing terrain of the property along its northern boundary adjacent at the SC 760 corridor alignment includes a deep, steeply sided ravine. Crossing this ravine for SC 760 would likely entail a significant bridge structure. Given the existing terrain, existing General Plan designations and zoning and recent subdivision, it is not anticipated that these parcels could be further subdivided, nor would the right-of-way for SC 760 be likely granted without County condemnation actions.

Area 3 (Beauchamp Property): This area consists of approximately 57-acres previously subdivided by PM 6352 into 4-lots plus a remainder lot. Each of these lots takes access from a private road from Hillside Drive. An Irrevocable Offer of Dedication for the SC 760 right-of-way was granted by the landowner at the time of recordation of PM 6352; however, none of the lots rely on or utilize the SC 760 alignment for access. Given the existing terrain, existing General Plan designations and zoning, it is not anticipated that these lots could be further subdivided.

Area 4 (Hendrix Property): This area consists of approximately 38-acres previously subdivided into 4 parcels by PM 8272. Each of these lots takes access from a private street connecting to Hillside Drive. Right-of-way for SC 760 was not dedicated with the recording of this parcel map. None of the existing parcels rely on SC 760 for access, and only one of the parcels, Parcel__4_ is adjacent to the SC 760 corridor. Given the topography of the area, current private road access, and wetland and riparian vegetation along and under the adopted SC 760 corridor alignment, it is unlikely that any further subdivision of Parcel 4 would rely on or utilize SC 760 for access.

Area 5 (Peaceful Valley Ranch): This area consists of the 180-acre PVR property. The PVR tentative subdivision map proposes that access to the individual lots be taken from Peaceful Valley Ranch Road, which is proposed to be realigned to intersect with SR-94 at Melody Road. PVR is not planned to take any access from SC 760, and is specifically requesting the deletion of the portion of SC 760 from Alta Vista Road to SR-94.

Area 6 (CDFG Preserve): This area consists of a triangular parcel once part of the Daley Ranch and now in the ownership of the California Department of Fish and Game. This parcel is part of the CDFG Daley Ranch preserve, and is designated and dedicated as biological preserve in the Multiple Species Conservation Program for San Diego County. No right-of-way for SC 760 was ever dedicated across this parcel. Development of SC 760 across the parcel would negatively impact the biological resources of the parcel, and, given the parcels current ownership, use, and preserve designation, would thereby violate the purpose and function of the preserve. Therefore, development of SC 760 across this Area 6 is considered infeasible.

Other Potential Large Scale Projects: In addition to the properties along the SC 760 corridor segment identified above, there are two other large landholdings in the general vicinity which could potentially develop in the future with a significant number of residential units. These two properties are the Simpson Ranch at the corners of SR-94, Jefferson Road and Olive Vista Drive; and, the Rancho Jamul Estates II property immediately north of and adjacent to Rancho Jamul Estates. With respect to the Simpson Ranch, access to the property and any related subdivision would logically be from any of the three roads fronting the property. Traffic flows would gravitate to SR-94 with no anticipated volumes connecting to SC 760. With respect to the Rancho Jamul Estates II property, northerly access is currently stubbed to the property at Jamul Highlands Road, and southerly access is provided via access easement rights to Priscilla Drive through Rancho Jamul Estates. The property does not abut SC 760, nor is any access connection to SC 760 anticipated.

In summary, there are no properties along the adopted SC 760 corridor from Olive Vista Drive to SR-94 that rely on SC 760 as a single access, or that would be significantly negatively impacted by the deletion of SC 760 from the County General Plan Circulation Element. All of the properties along the corridor are already accessed by, or could be accessed by, existing local roads. The SC 760 right-of-way dedications and/or irrevocable offers of dedication are intermittent along the corridor. Dedications of the remaining segments of right-of-way are unlikely in the absence of condemnation actions by the County of San Diego. In the case of the CDFG landholding, these dedications are infeasible because the development of SC 760, if constructed, would negatively impact the biological resources of the existing preserve thereby violating the purpose of the preserve. Additionally, the development of SC 760, if constructed, could have a significant environmental effect relating to community character and noise within existing neighborhoods currently accessed by private streets or planned private street access. Finally, the development of SC 760, if constructed, would likely have a significant impact on biological resources as a result of the number and extent of required road crossing through wetland habitat and riparian vegetation. Based on the analysis above, the proposal to delete a segment of SC 760 from the Circulation Element would not preclude access to any current or future properties along the identified corridor. Therefore, potential impacts associated with access to SC 760 along the corridor segment proposed for deletion are considered less than significant.

Segment of SC 760 from Lyons Valley Road to Olive Vista Drive

The northernmost segment of SC 760 from Lyons Valley Road to Olive Vista Drive is not proposed for deletion from the County's General Plan Circulation Element. Dedication of or Irrevocable Offers of Dedication of the right-of-way for this entire segment have already been granted by the property owners along the corridor with the recordation of PM 8637, PM 9916, and TM 3978. A dirt path currently exists along this segment of the corridor, which path is currently used predominantly by schoolchildren connecting from the Jamul Primary and Intermediate schools on Lyons Valley Road to the Oak Grove Middle School on Olive Vista Drive. Improvement of this segment of SC 760 would provide direct vehicular access to the Oak Grove Middle School from Lyons Valley Road, as well as providing a secondary means of ingress and egress to the school and residential uses along Olive Vista Drive. Because of these potential transportation and community benefits, deletion of this segment of SC 760 from the County General Plan Circulation Element is not proposed.

11.0 Traffic Signal Warrants

A traffic signal warrant analysis was conducted at the SR 94/Melody Road/Project Driveway intersection. The planning warrants from the Manual on Uniform Traffic Control Devices (MUTCD) 2003 California Supplement were utilized. **Appendix J** contains the worksheets. Signal warrants are *not* met, based on traffic volumes, for the existing and existing + project conditions but they *are met* for the existing + project + cumulative projects scenario, principally due to traffic form the proposed casino.

12.0 Year 2030 Assessment

12.1 Traffic Forecast

SC 760 is a County Circulation Element Roadway (classified as a Light Collector), which connects Lyons Valley Road to Otay Lakes Road. The applicant is proposing to delete the portion of SC 760 between Olive Vista Drive and SR 94 from the Circulation Element. **Figure 11** shows the SC 760 deletion. To test the impacts of this deletion, several traffic model runs were completed. The model runs were completed with two different land use assumptions for the (1) County General Plan (Adopted Policies and General Plan 2020 Policies), and (2) the proposed Jamul Casino, one with the preferred alternative (9,660 ADT generation) and one with the worst-case alternative (37,000 generation). In order to provide an "apple-to-apple" traffic comparison with and without SC 760, the project unit count was kept constant. It should be noted that, although the proposed General Plan Amendment land use designation would theoretically allow up to 90 dwelling units on this site, the Tentative Map for the project proposes to limit the development of the site to 46 new dwelling units, in addition to the 1 existing dwelling unit (for a total of 47 dwelling units), plus the 3 non-residential use lots, one open space lot, and 6 private road lots previously identified.

- Eight (8) Year 2030 Model forecasts were conducted using the SANDAG Series 10.0 model run to assess the deletion of SC 760. The General Plan 2020 land uses are assumed in the model for 4 of the runs and Existing Policies Land Uses were assumed for the other 4. **Table 5** shows the results of the 8 model runs.

Figures 12-15 show the model run results. Table 5 shows the forecasted operations. As Table 5 shows, SC 760 is forecasted to carry very small volumes (900 -1,500 ADT). This table also shows that the volumes on SR 94 increase only very slightly due to the deletion of SC 760 (0.5% - 2%). Although the construction of SC 760 would carry only a small amount of traffic (1,500 ADT), the future traffic volume forecast (Table 5) indicated that with the deletion of the segment of SC 760 from Olive Vista Drive to SR 94, traffic volumes on the SR 94 roadway segments would be from 0 ADT to 1,300 ADT higher, depending on the specific segment and land use scenario analyzed. Since the 2-lane portion of SR 94 is forecasted to operate at LOS F, a significant plan-to-plan impact is calculated to occur with the proposed deletion of the identified segment of SC 760. It should also be noted that LOS F is calculated for all segments of SR 94 with or without SC 760 assuming SR 94 in not widened to four lanes. If SR 94 is widened to four lanes, the LOS for the majority of the Model Runs are calculated to operate at LOS D or better, with the exception of the segment between Steele Canyon Road and Lyons Valley Road, which is calculated to continue to operate at below LOS D conditions.

It should be noted that 1,500 ADT on SC 760 is within the carrying capacity of a County non-Circulation Element public roadway. **Appendix K** contains the Year 2030 Traffic Model Forecast for the four scenarios.

TABLE 5
YEAR 2030 ANALYSIS
FUTURE TRAFFIC VOLUME COMPARISON

Roadway Segment	# of Lanes	Year 2030 Capacity (LOS E)[3]	2020 General Plan Land Uses								Existing Adopted Policies Land Uses							
			Jamul Casino				Worst-Case Jamul Casino				Jamul Casino				Worst-Case Jamul Casino			
			Model Run #1[4] With SC 760		Model Run #2 Without SC 760		Model Run #3 With SC 760		Model Run #4 Without SC 760		Model Run #5 With SC 760		Model Run #6 Without SC 760		Model Run #7 With SC 760		Model Run #8 Without SC 760	
			ADT[5]	LOS[6]	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
SR 94																		
Steele Canyon Road to Lyons Valley Road	Existing 2-Lane Widen to 4-Lanes	16,200[1] 37,000[2]	33,500	F E	33,500	F E	38,800	F F	38,800	F F	38,200	F F	38,300	F F	39,100	F F	39,200	F F
Lyons Valley Road to Melody Road	Existing 2-Lane Widen to 4-Lanes	16,200 37,000	21,000	F B	21,200	F B	31,800	F D	32,200	F D	28,800	F C	29,600	F C	34,000	F E	35,100	F E
South of Melody Rd.	Existing 2-Lane Widen to 4-Lanes	16,200 37,000	15,500	E B	15,600	E B	16,500	F B	16,500	F B	22,300	F B	23,200	F B	22,900	F B	24,200	F B
Olive Vista Drive																		
West of SC 760	2-Lanes	16,200	800	A	2,300	B	800	B	2,000	B	4,200	C	4,100	C	4,500	C	4,000	B
SC 760																		
South of Olive Vista Dr.	2-Lanes	16,200	1,500	A	DNE[7]	DNE[7]	1,300	A	DNE[7]	DNE[7]	900	A	DNE[7]	DNE[7]	1,400	A	DNE[7]	DNE[7]
Jefferson Road																		
Olive Vista Dr. to SR 94	2-Lanes	16,200	6,900	C	7,100	D	9,000	D	9,400	D	16,300	F	16,600	F	16,400	F	17,300	F
Lyons Valley Road																		
Jefferson Rd. to SR 94	2-Lanes	16,200	8,600	D	8,600	D	7,800	D	7,800	D	9,700	D	9,700	D	9,600	D	9,500	D

Notes:

1. Capacity if SR 94 remains as a two-lane facility.
2. Capacity if SR 94 is widened to four-lanes.
3. Capacity based on the County of San Diego Roadway Classifications, Level of Service and ADT Table.
4. See text for Model descriptions.
5. ADT - Average Daily Traffic.
6. LOS - Level of Service.
7. DNE - Does not exist.

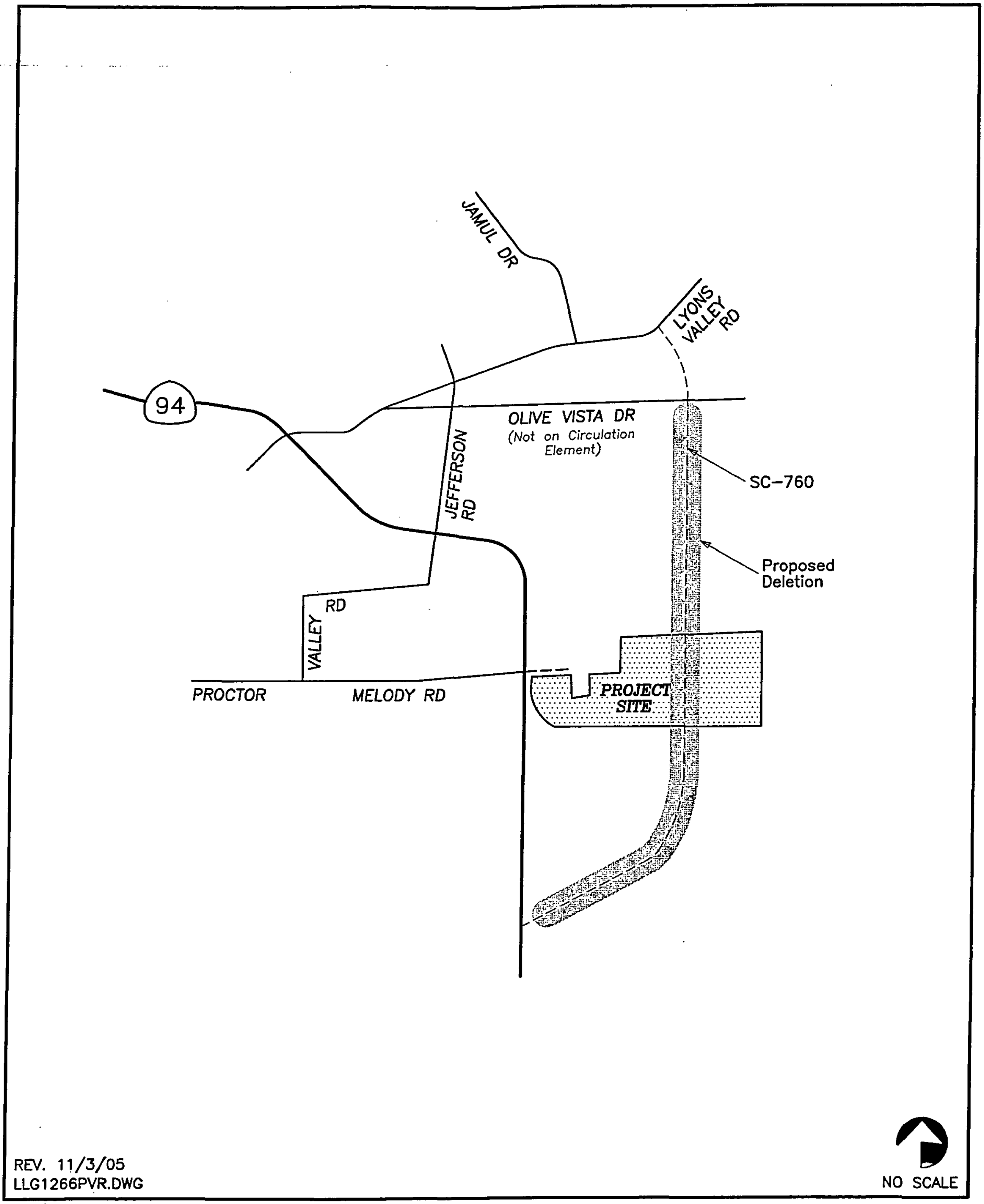

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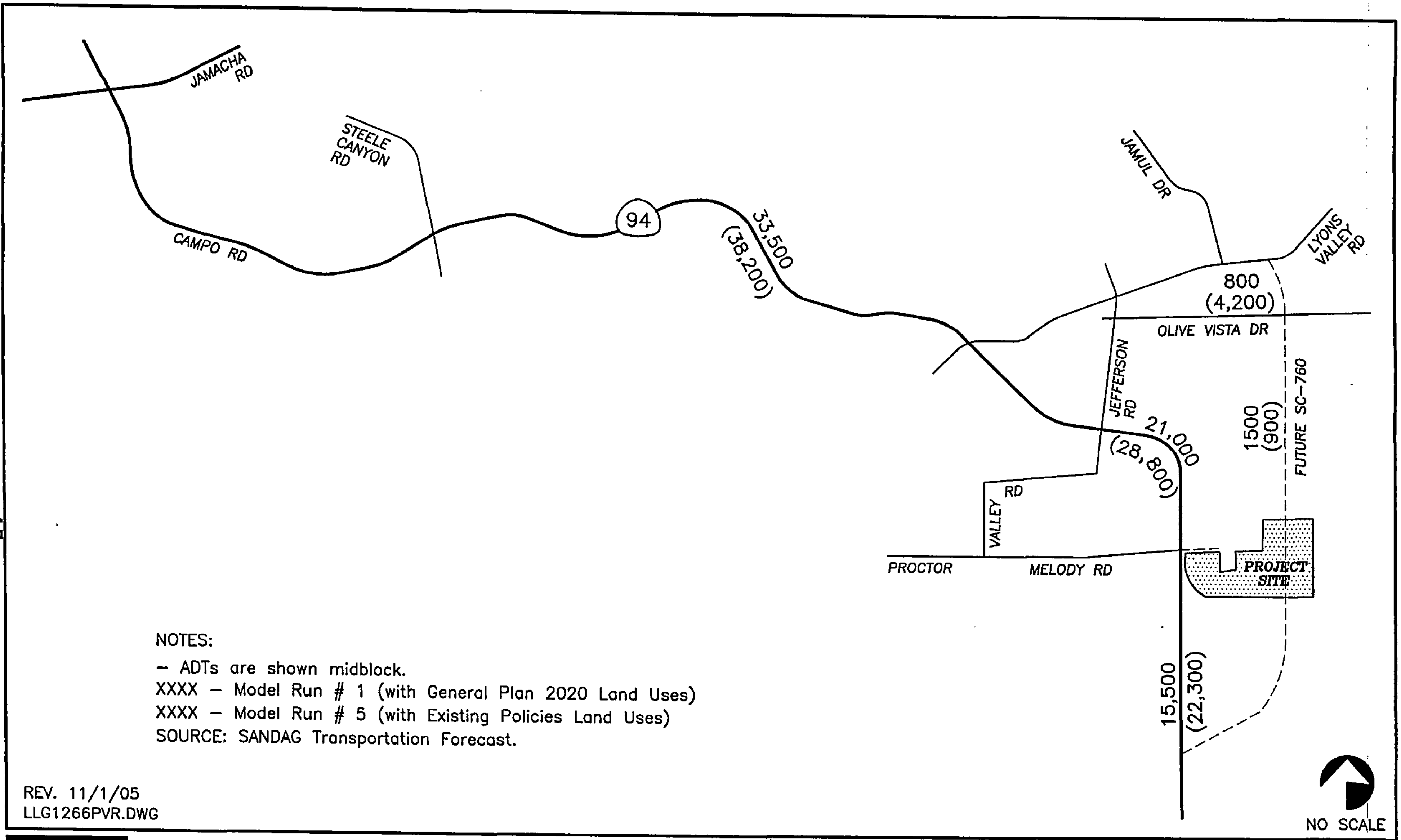
Figure 11

SC 760 COUNTY CIRCULATION ELEMENT DELETION

PEACEFUL VALLEY RANCH



NOTES:
- ADTs are shown midblock.
XXXX – Model Run # 1 (with General Plan 2020 Land Uses)
XXXX – Model Run # 5 (with Existing Policies Land Uses)
SOURCE: SANDAG Transportation Forecast.

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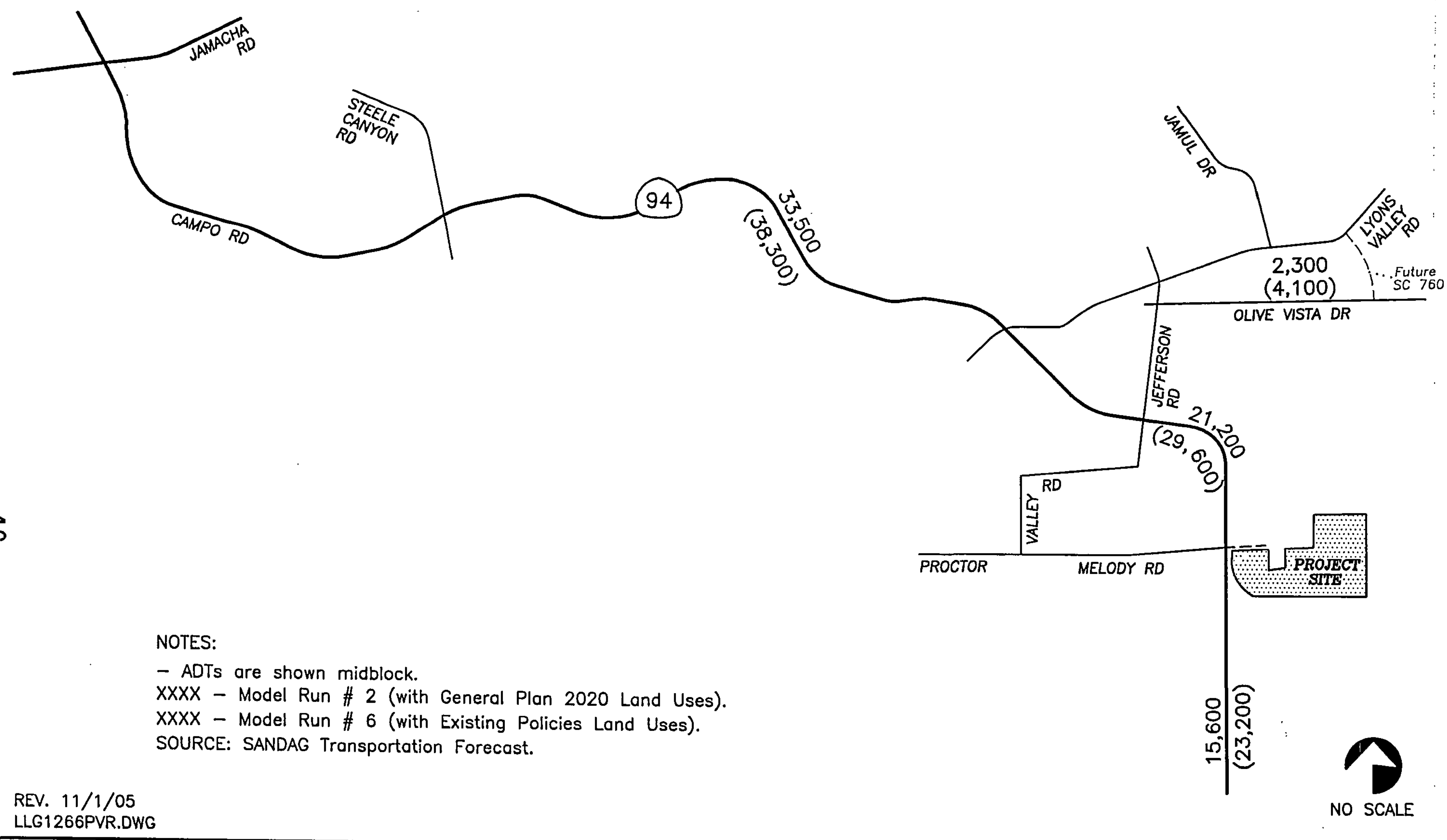
Figure 12

YEAR 2030 WITH SC 760 ROADWAY with PROPOSED JAMUL CASINO PROJECT
TRAFFIC VOLUMES
ADTs
PEACEFUL VALLEY RANCH



NOTES:

- ADTs are shown midblock.

XXXX – Model Run # 2 (with General Plan 2020 Land Uses).

XXXX – Model Run # 6 (with Existing Policies Land Uses).

SOURCE: SANDAG Transportation Forecast.

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LLG1266PVR.DWG

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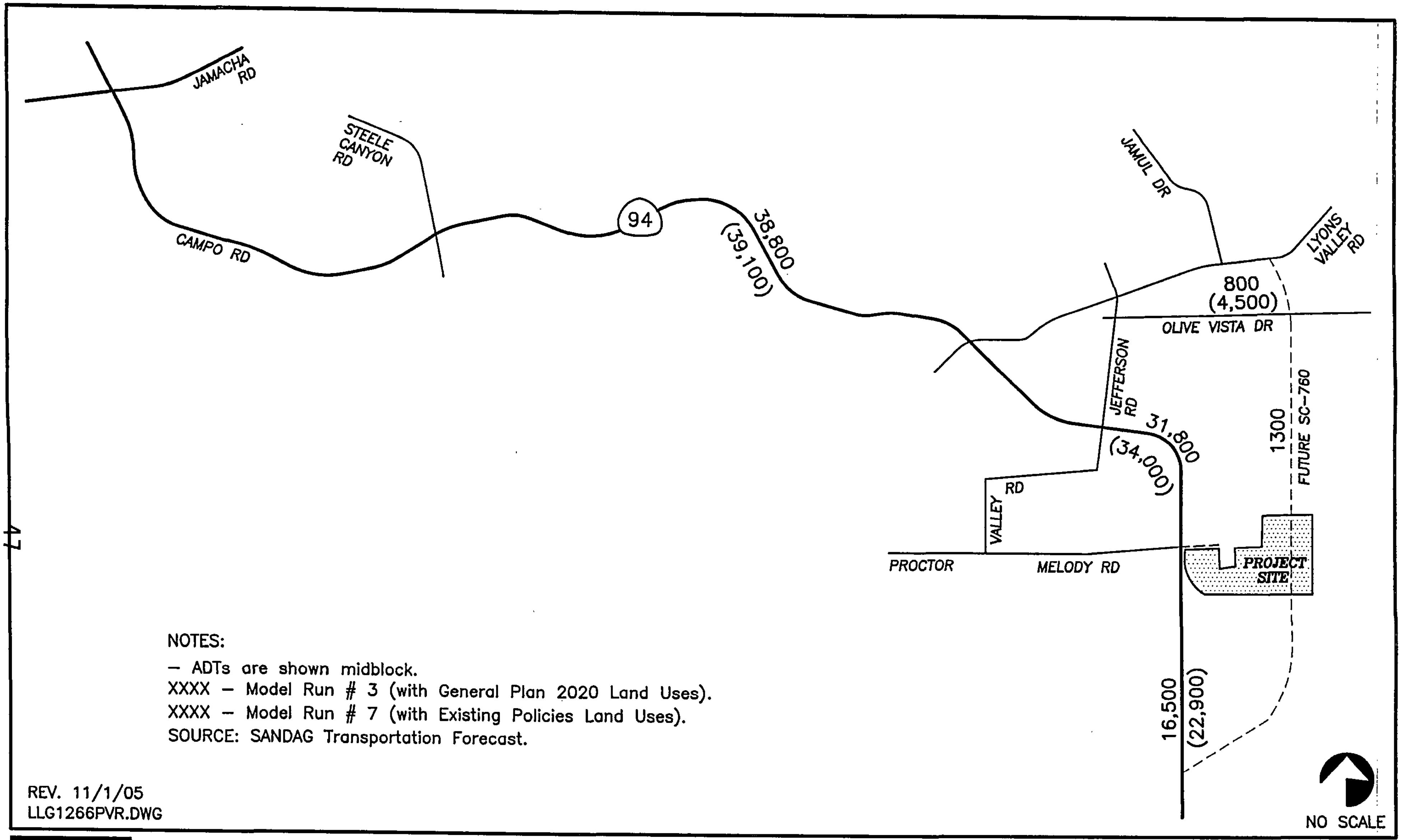
Figure 13

YEAR 2030 WITHOUT SC 760 ROADWAY with PROPOSED JAMUL CASINO PROJECT TRAFFIC VOLUMES ADTs

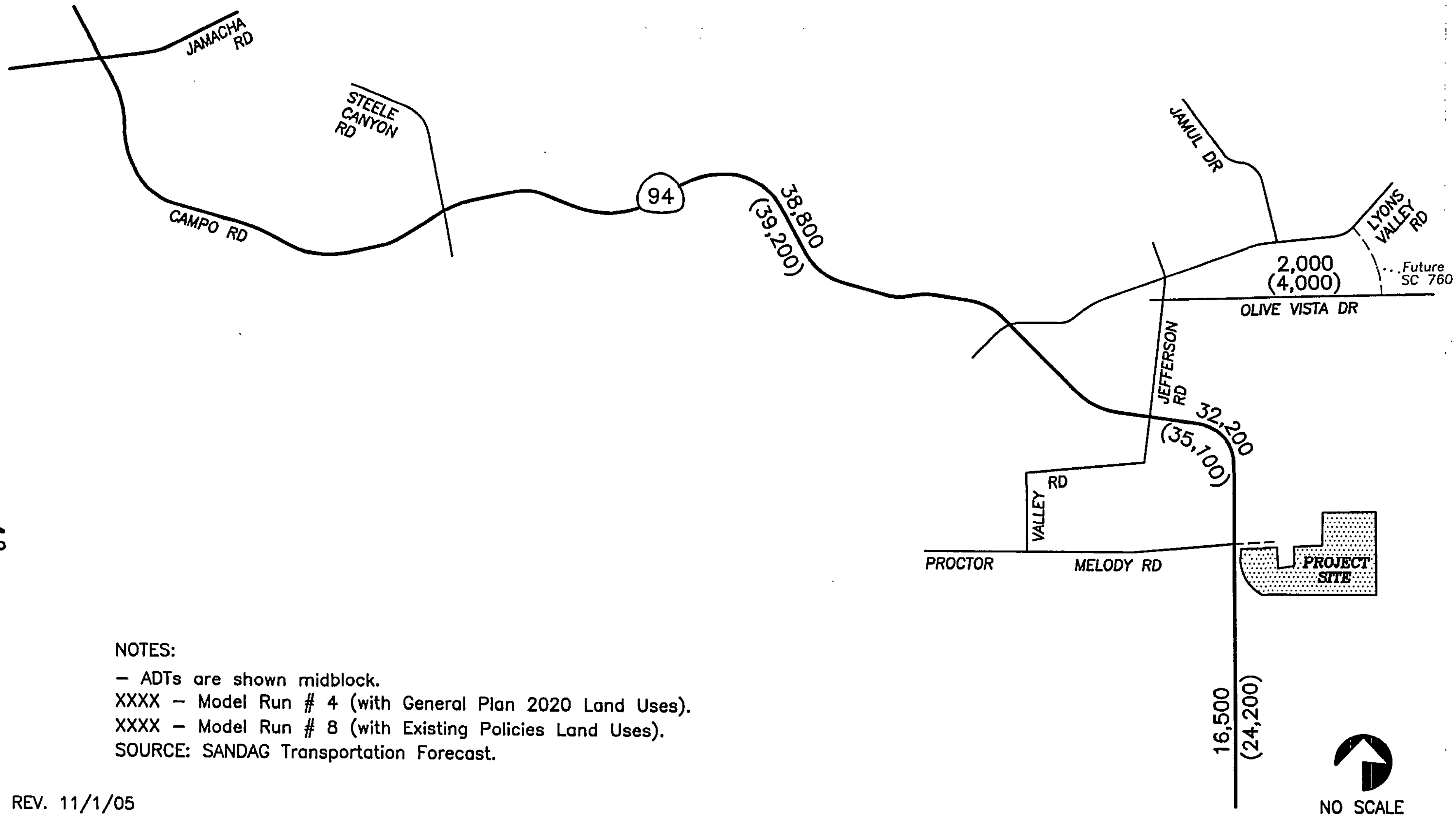
PEACEFUL VALLEY RANCH



LINSCOTT LAW & GREENSPAN engineers

Figure 14

YEAR 2030 WITH SC 760 ROADWAY with WORST-CASE JAMUL CASINO PROJECT
TRAFFIC VOLUMES
ADTs
PEACEFUL VALLEY RANCH



NOTES:
– ADTs are shown midblock.
XXXX – Model Run # 4 (with General Plan 2020 Land Uses).
XXXX – Model Run # 8 (with Existing Policies Land Uses).
SOURCE: SANDAG Transportation Forecast.

REV. 11/1/05
LLG1266PVR.DWG

LINSCOTT LAW & GREENSPAN engineers

Figure 15

YEAR 2030 WITHOUT SC 760 ROADWAY with WORST-CASE JAMUL CASINO PROJECT
TRAFFIC VOLUMES
ADTs
PEACEFUL VALLEY RANCH

12.2 Proposed Improvements to SR 94

Future improvements to SR 94 have been proposed in three documents. The County General Plan, Mobility 2030 document, and the Rural Highway 94 Corridor Study all detail potential future improvements to SR 94 (from Jamacha Road to south of Melody Road). **Table 6** provides a comparison of potential future improvements to SR 94. Currently, SR 94 is constructed as a two-lane roadway (one lane per direction) from Jamacha Road to the border. As shown in Table 6, the County General Plan classification for SR 94 is Prime Arterial from Jamacha Road to Melody Road and transitioning to a Major Road classification (4-lanes) south of Melody Road. The Mobility 2030 and Rural Highway 94 Corridor Study show only improving the segment between Jamacha Road and Steele Canyon Road by widening from a two-lane to a four-lane Conventional Highway. **Appendix L** provides documentation from the three documents detailing proposed improvements to SR 94.

TABLE 6

SR 94 PROPOSED IMPROVEMENTS

SR 94 Segment Limits	County General Plan Classification	Mobility 2030 Classification	Rural Highway 94 Corridor Study Classification
Jamacha Rd to Steele Canyon Rd	Prime Arterial (6-Lanes)	4-Lane Conventional. Highway	4-Lane Conventional Highway
Steele Canyon Rd to Lyons Valley Rd	Prime Arterial (6-Lanes)	2-Lane Roadway	2-Lane Roadway
Lyons Valley Rd to Melody Road	Prime Arterial (6-Lanes)	2-Lane Roadway	2-Lane Roadway
South of Melody Road	Major Road (4-Lanes)	2-Lane Roadway	2-Lane Roadway

13.0 Significance of Impacts / Mitigation Measures

Following is a description of the calculated significant impacts for the project based on the established Significance Criteria in Section 6.0 along with recommendations for mitigation measures at the impacted locations.

13.1 Significant Impacts

The following key intersections and street segments were determined to be directly or cumulatively impacted by the project using established significance criteria described in Section 6.0 and based on the results of Table 3a, 4 and 5. A significant impact on SR 94 is calculated on both a plan-to-ground and a plan-to-plan basis.

13.1.1 Direct Impacts

a. SR 94 segment: Jamacha Road to Steele Canyon Road
b. SR 94 segment: Steele Canyon Road to Lyons Valley Road
c. SR 94 segment: Lyons Valley Road to Melody Road

Direct Impacts (Plan to Plan with Deletion of SC 760 Segment from Olive Vista Drive to SR 94)

a1. SR 94 segment: Jamacha Road to Steele Canyon Road
b1. SR 94 segment: Steele Canyon Road to Lyons Valley Road
c1. SR 94 segment: Lyons Valley Road to Melody Road

13.1.2 Cumulative Impacts

d. SR 94 / Lyons Valley Road intersection
e. SR 94 / Melody Road intersection
f. SR 94 / Steele Canyon Road – (Cumulative impact determined only based on ILV analysis.)

13.2 Mitigation Measures

a-c. The direct impact to SR 94 cannot be fully mitigated without widening SR 94 between Jamacha Road and Melody Road to 4 lanes. In order to partially mitigate the project's impact to SR 94, the project proposes to contribute a fair share towards improvements at the SR 94/Jefferson Road intersection as requested by Caltrans. However, project impacts on SR 94 remain significant and not completely mitigated.

d. The payment of County Traffic Impact Fees as established by County Code would mitigate the project's contribution to significant cumulative impacts at the SR 94/Lyons Valley Road intersection.

e. Contribute towards the future signalization of the SR 94/Melody Road intersection, through the payment of County Traffic Impact Fees. Provide a dedicated southbound left turn lane on SR 94 and two westbound approach lanes on Melody Road. Appendix G contains the conceptual striping plan for the SR 94/Melody Road intersection.

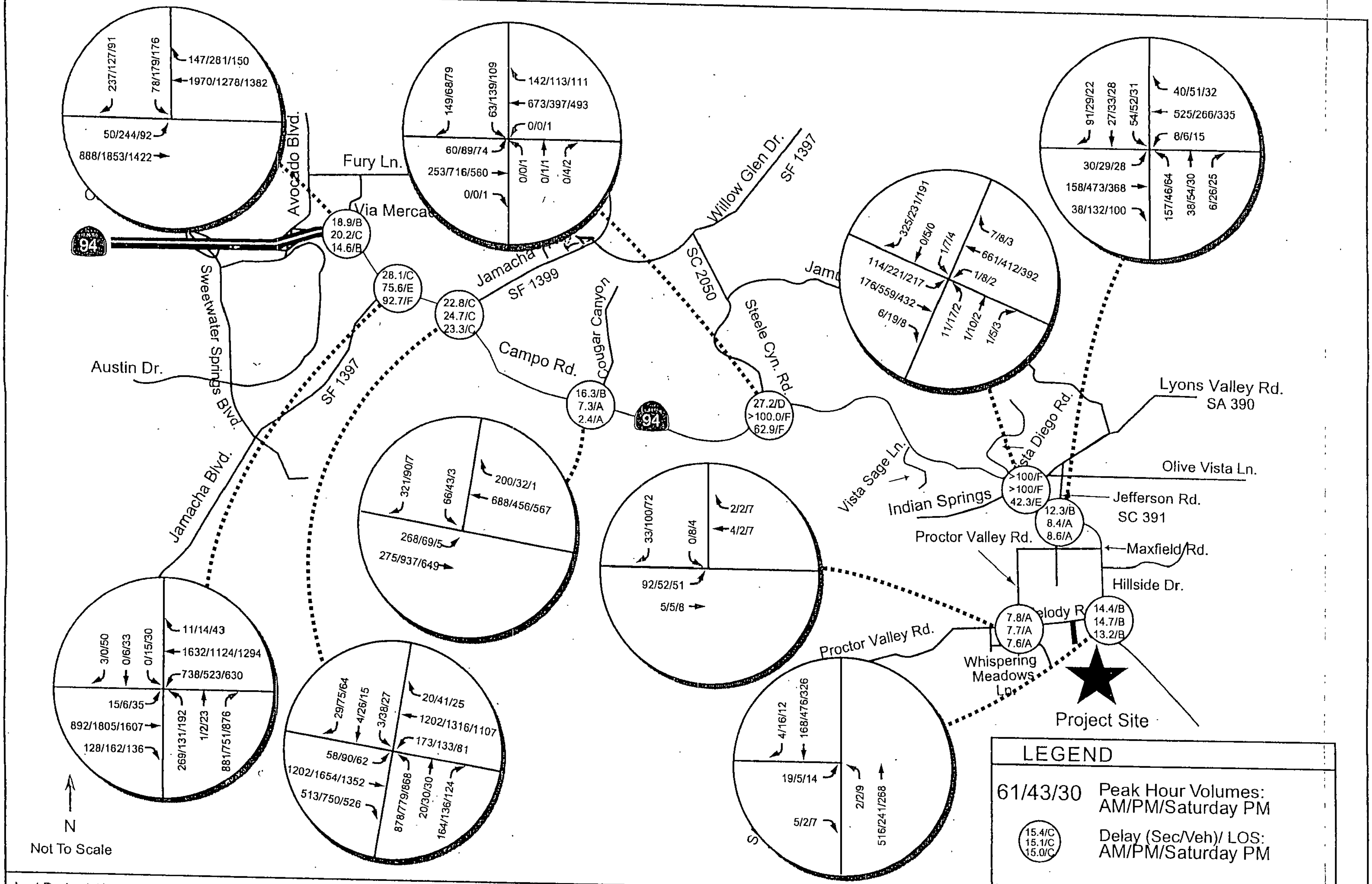
   Traffic signal warrants are not met for the existing + project scenario but are met for the existing + project + cumulative projects scenario. A traffic signal should be installed once the County of San Diego and Caltrans determine that warrants are met.

f. The payment of County Traffic Impact Fees as established by County Code would mitigate the project's contribution to significant cumulative impacts at the SR 94/ Steele Canyon Road intersection.

   Not related to a significant traffic impact, it is also recommended that the project dedicate ROW on SR 94 along the project frontage to County/Caltrans standards. It should be noted that the project would need to obtain construction and encroachment permits for any work performed within the County's or Caltrans right-of-way. It is not recommended that the improvements actually be constructed at this time since SR 94 will not be improved either north or south of the project and the widened portion may be confusing to the driver. This is because this would be the only segment along SR 94 between Tecate and Steele Canyon Road where a second northbound through lane would be provided and the length along the project frontage would not be enough to provide adequate transition at 55 mph from 1 northbound lane to 2 lanes and then back to one lane again. In addition, northbound drivers may treat the second northbound lane as a defacto passing lane thereby creating a potentially unsafe situation. Finally, in the 2030 mobility plan, this section of SR 94 would remain a two lane conventional highway. The widening should occur when adjacent portions of SR 94 are widened.

APPENDIX A

INTERSECTION MANUAL & SEGMENT COUNT SHEETS



Last Revised: November 13, 2002

Figure 6

Existing Weekday AM, PM, & Saturday Midday Peak Hour Intersection Conditions

Katz, Okitsu & Associates
Traffic Engineers and Transportation Planners

Traffic and Vehicle Data Systems Unit

Route 92 - 98 View

2002 All Traffic Volumes on CSHS

[Files]

The files containing traffic volumes (also known as counts) on California state highways are available for downloading. These files can be imported into spreadsheets or data bases for viewing and analysis.

[Route Number]

All California state highways are listed in this booklet in order of Legislative Route number.

[Annual Average Daily Traffic (Annual ADT)]

Annual average daily traffic is the total volume for the year divided by 365 days. The traffic count year is from October 1st through September 30th. Very few locations in California are actually counted continuously. Traffic Counting is generally performed by electronic counting instruments moved from location throughout the State in a program of continuous traffic count sampling. The resulting counts are adjusted to an estimate of annual average daily traffic by compensating for seasonal influence, weekly variation and other variables which may be present. Annual ADT is necessary for presenting a statewide picture of traffic flow, evaluating traffic trends, computing accident rates. planning and designing highways and other purposes.

[Peak Hour]

Included is an estimate of the "peak hour" traffic at all points on the state highway system. This value is useful to traffic engineers in estimating the amount of congestion experienced, and shows how near to capacity the highway is operating. Unless otherwise indicated, peak hour values indicate the volume in both directions.

A few hours each year are higher than the "peak hour", but not many. In urban and suburban areas, the peak hour normally occurs every weekday, and 200 or more hours will all be about the same. On roads with large seasonal fluctuations in traffic, the peak hour is the four near the maximum for the year but excluding a few (30 to 50 hours) that are exceedingly high and are not typical of the frequency of the high hours occurring during the season.

[Traffic Profile]

These files list 2002 taffic volumes for all count locations on the California state highway system. Peak hours, peak month ADTs and annual ADTs are shown at each count location. Significant volume changes (breakpoints)in the traffic profile along each route are counted and identified by name and milepost value. In addition to the profile breakpoints, these files list county lines and well-known landmarks to aid in orientation. All traffic volume figures listed include traffic in both directions unless otherwise indicated.

[Milepost]

Each profile breakpoint is identified by the milepost value corresponding to that point on the highway. The milepost values increase from the beginning of a route within a count to the next county line. The milepost values start over again at each county line. Milepost values usually increase from south to north or west to east depending upon the general direction the route follows within the state.

The milepost at a given location will remain the same year after year. When a section of road is relocated, new milepost (usually noted by an alphabetical prefix such as "R" or "M") are established for it. If relocation results in a change in length, "milepost equations" are introduced at the end of each relocated portion so that mileposts on the reminder of the route within the county will remain unchanged.

[Peak Month ADT]

The peak month ADT is the average daily traffic for the month of heaviest traffic flow. This data is obtained because on many routes, high traffic volumes which occur during a certain season of the year are more representative of traffic conditions than the annual ADT.

[Back and Ahead]

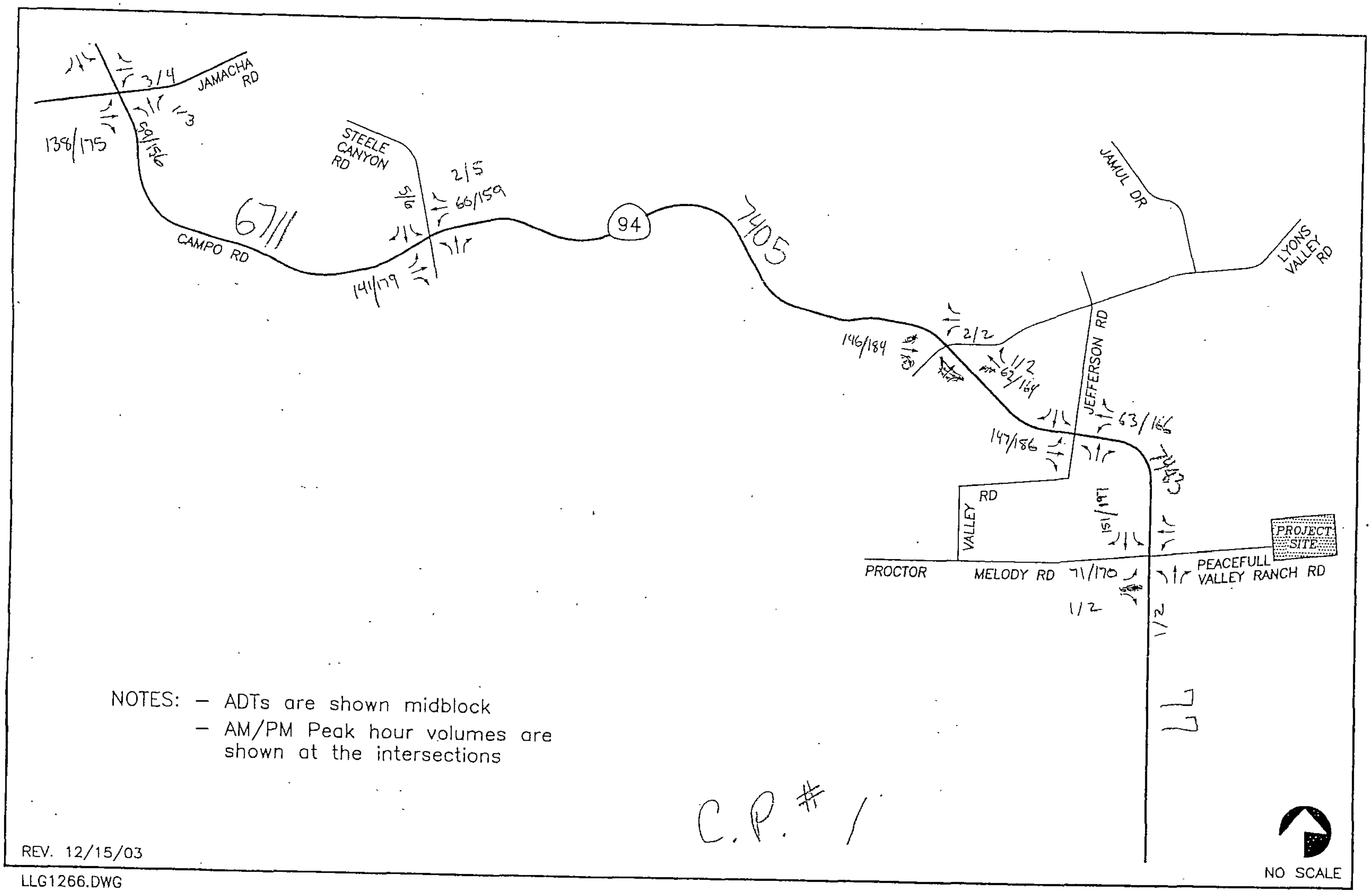
Back AADT, Peak Month, and Peak Hour usually represents traffic South or West of the count location. Ahead AADT, Peak Month, and Peak Hour usually represents traffic North or East of the count location. A listing of routes with their designated direction of travel is listed here.

			PostMile	Post		Back			Ahead		
District	Route	County	Prefix	Mile	Description	Peak Hr	Peak Mo	AADT	Peak Hr	Peak Mo	AADT

11	94	SD	14.86	JCT. RTE. 54 NORTH	4800	61000	59000	1650	21200	20600
11	94	SD	17.35	STEELE CANYON ROAD	1650	21200	20600	1450	18500	18000
11	94	SD	19.4	LYONS VALLEY ROAD	1450	18500	18000	960	12200	11900

APPENDIX B

CUMULATIVE PROJECTS TRAFFIC DATA



LLG1266.DWG

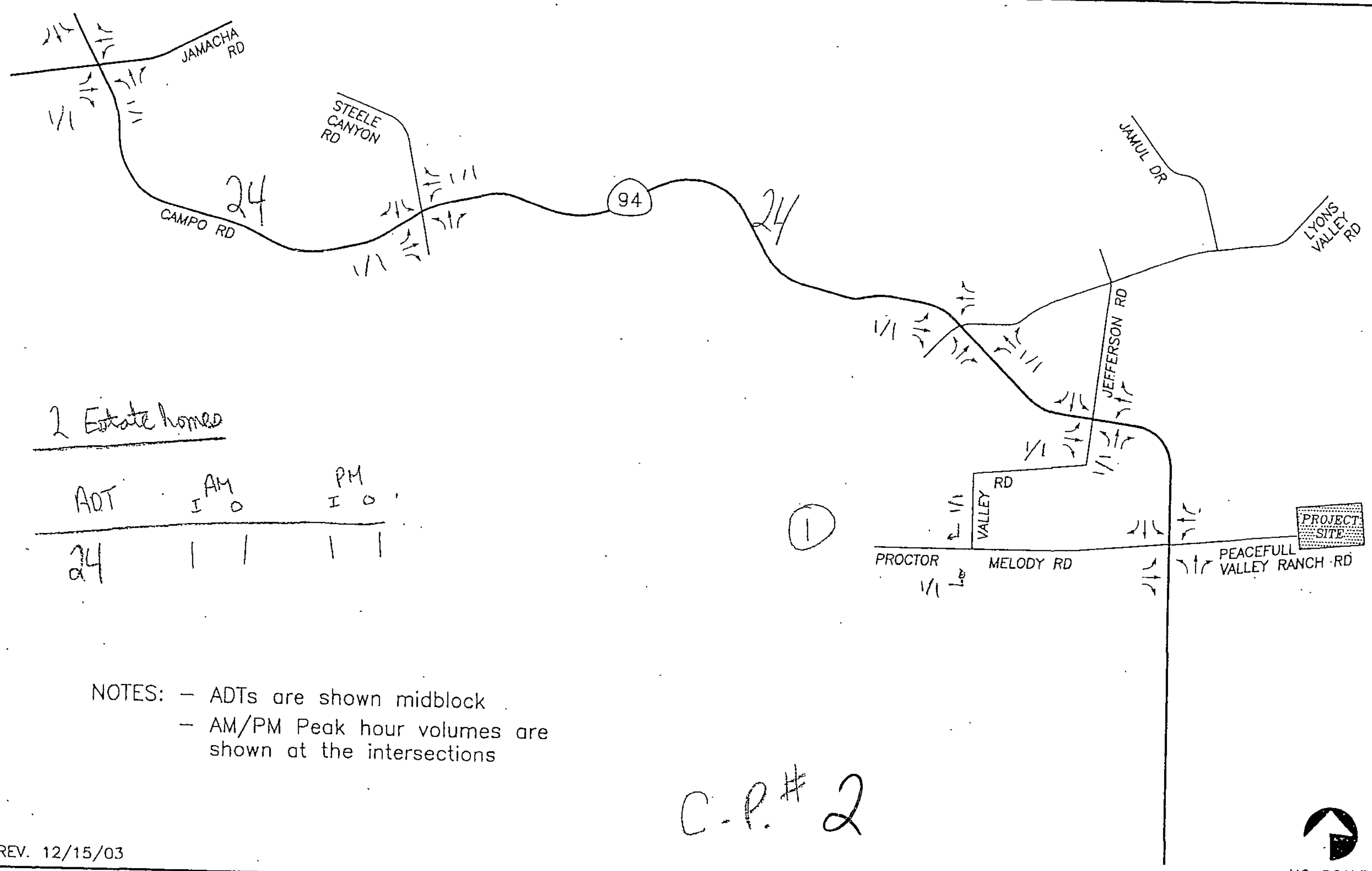
LINSCOTT LAW & GREENSPAN ENGINEERS

Jamul Indian Village

(Preferred Alt.) Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



1 Estate homes

ADT	AM I	AM O	PM I	PM O
24	1	1	1	1

NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

(1)

C-P. # 2

REV. 12/15/03

LLG1266.DWG

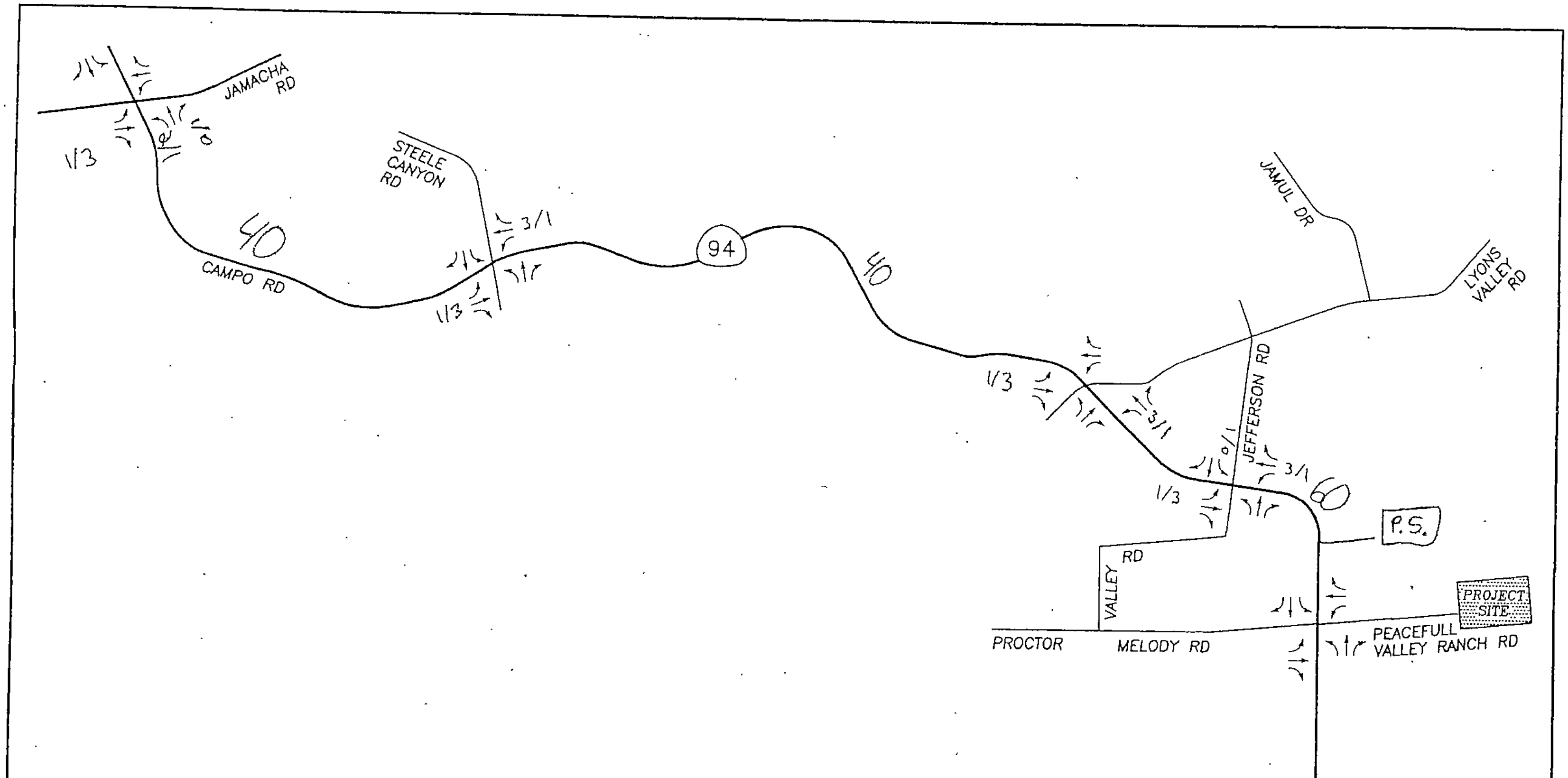
LINSCOTT LAW & GREENSPAN ENGINEERS

TM 20550 development

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



NOTES: – ADTs are shown midblock.
– AM/PM Peak hour volumes are shown at the intersections

C.P. #3

REV. 12/15/03

LLG1266.DWG

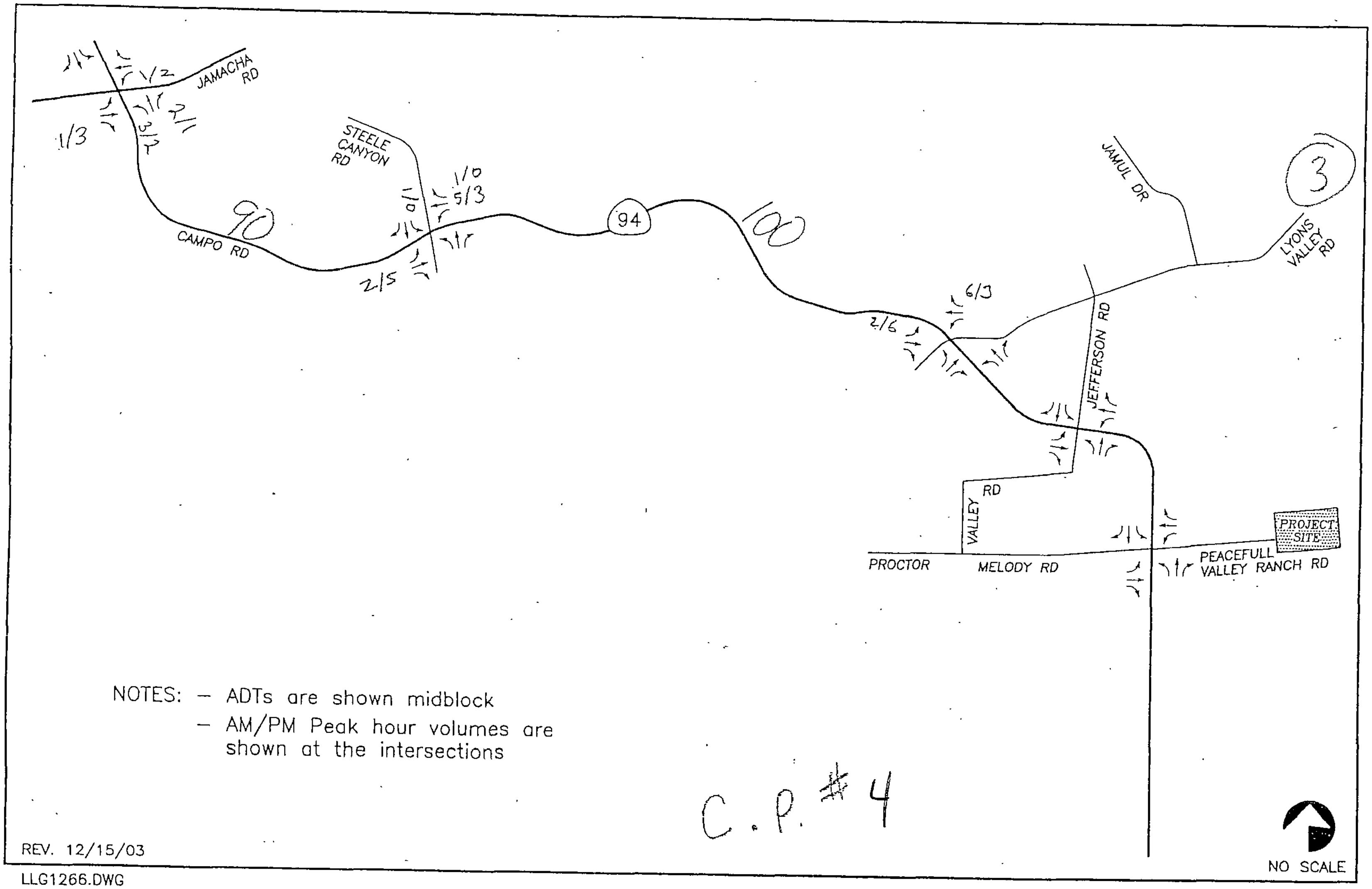
LINSCOTT LAW & GREENSPAN ENGINEERS

(TM 5154) Hendrix Subdivision

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



LLG1266.DWG

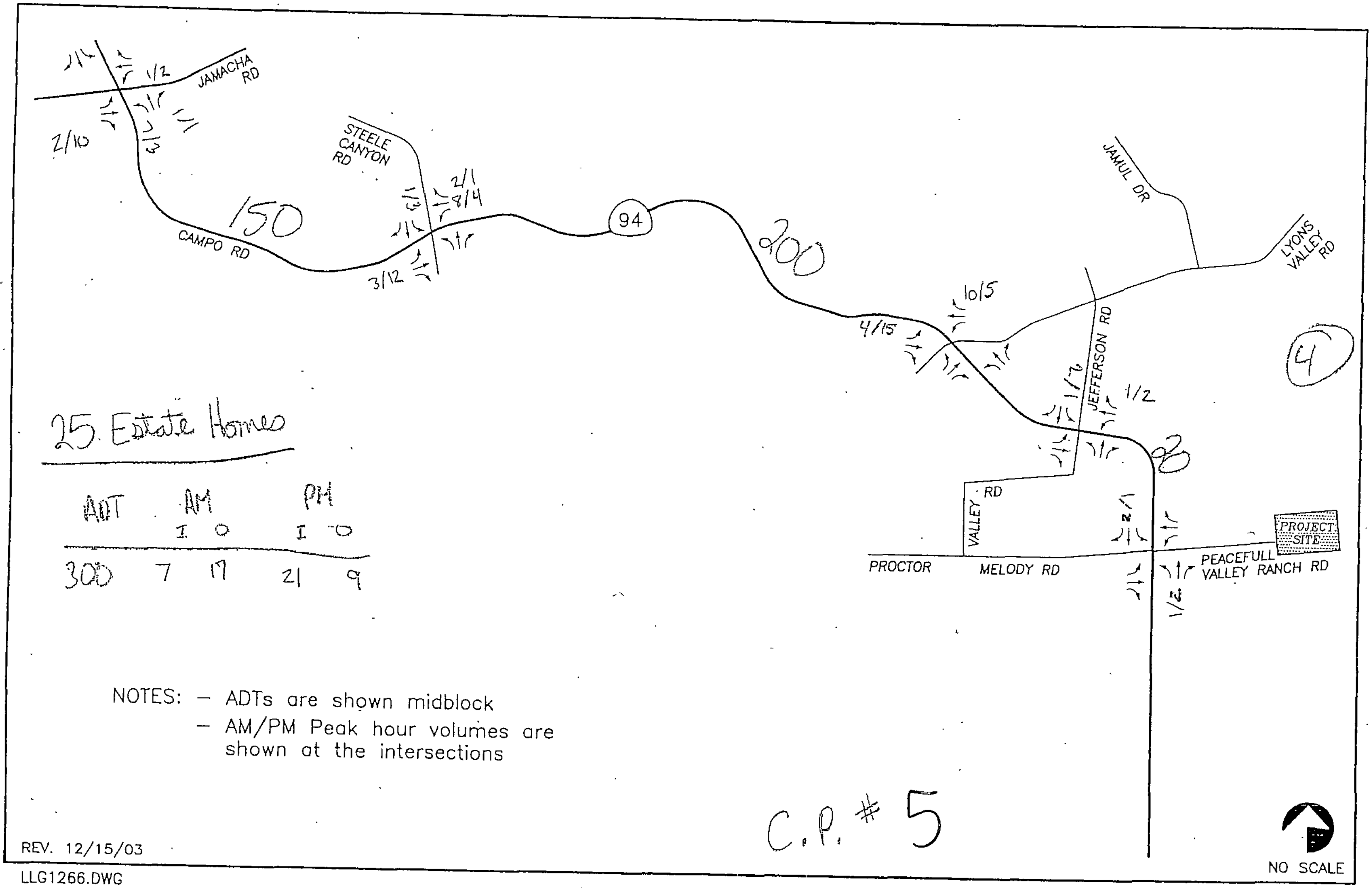
LINSCOTT LAW & GREENSPAN ENGINEERS

Mintz Subdivision

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



25 Estate Homes

ADT	AM I	AM O	PM I	PM O
300	7	17	21	9

NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

C.P. # 5

REV. 12/15/03

LLG1266.DWG

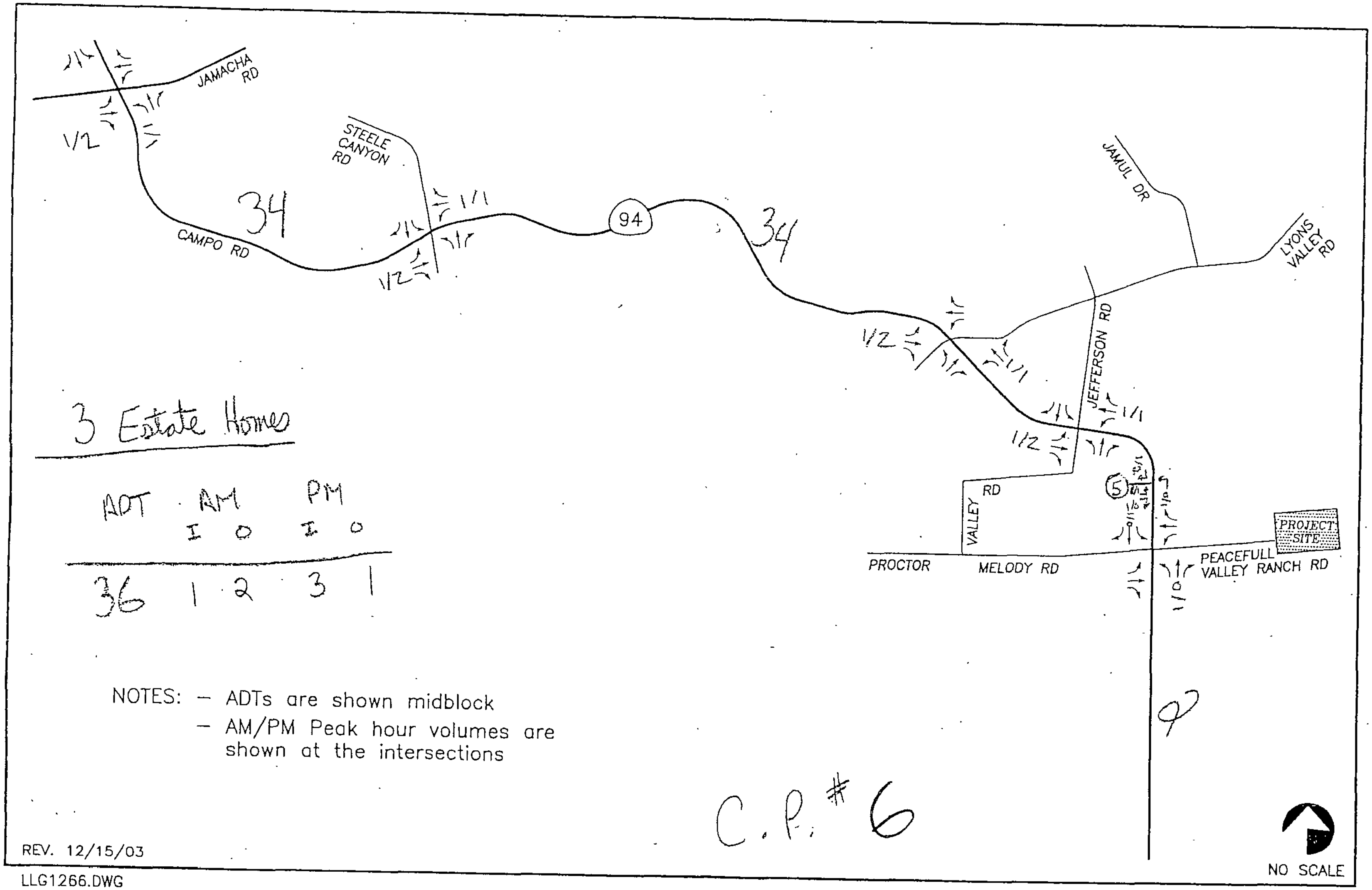
LINSCOTT LAW & GREENSPAN
ENGINEERS

Jamul Highlands (TM 5289)

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



3 Estate Homes

ADT	AM I	AM O	PM I	PM O
36	1	2	3	1

NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

REV. 12/15/03
LLG1266.DWG

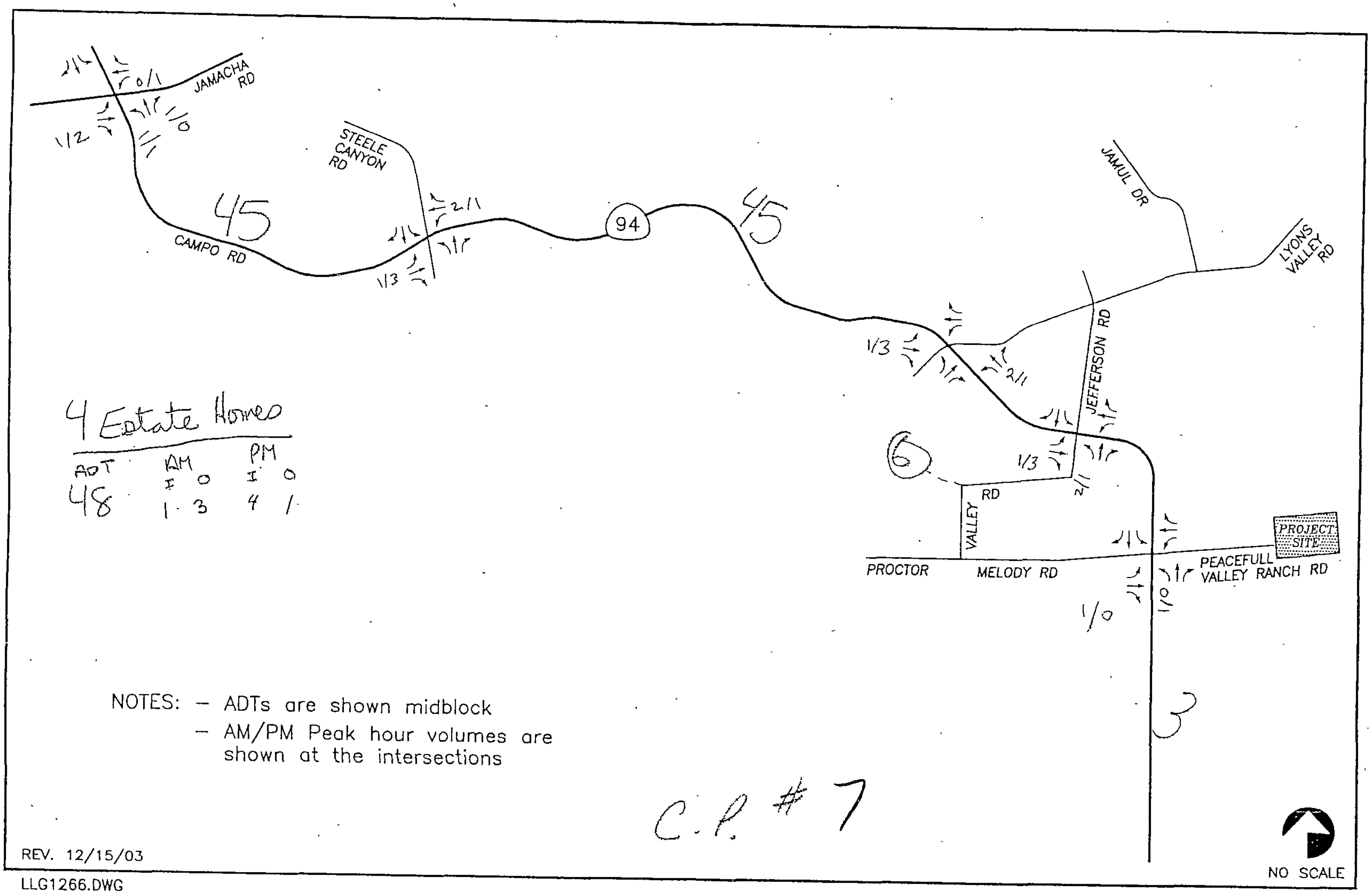
LINSCOTT LAW & GREENSPAN ENGINEERS

TPM 20626

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



LLG1266.DWG

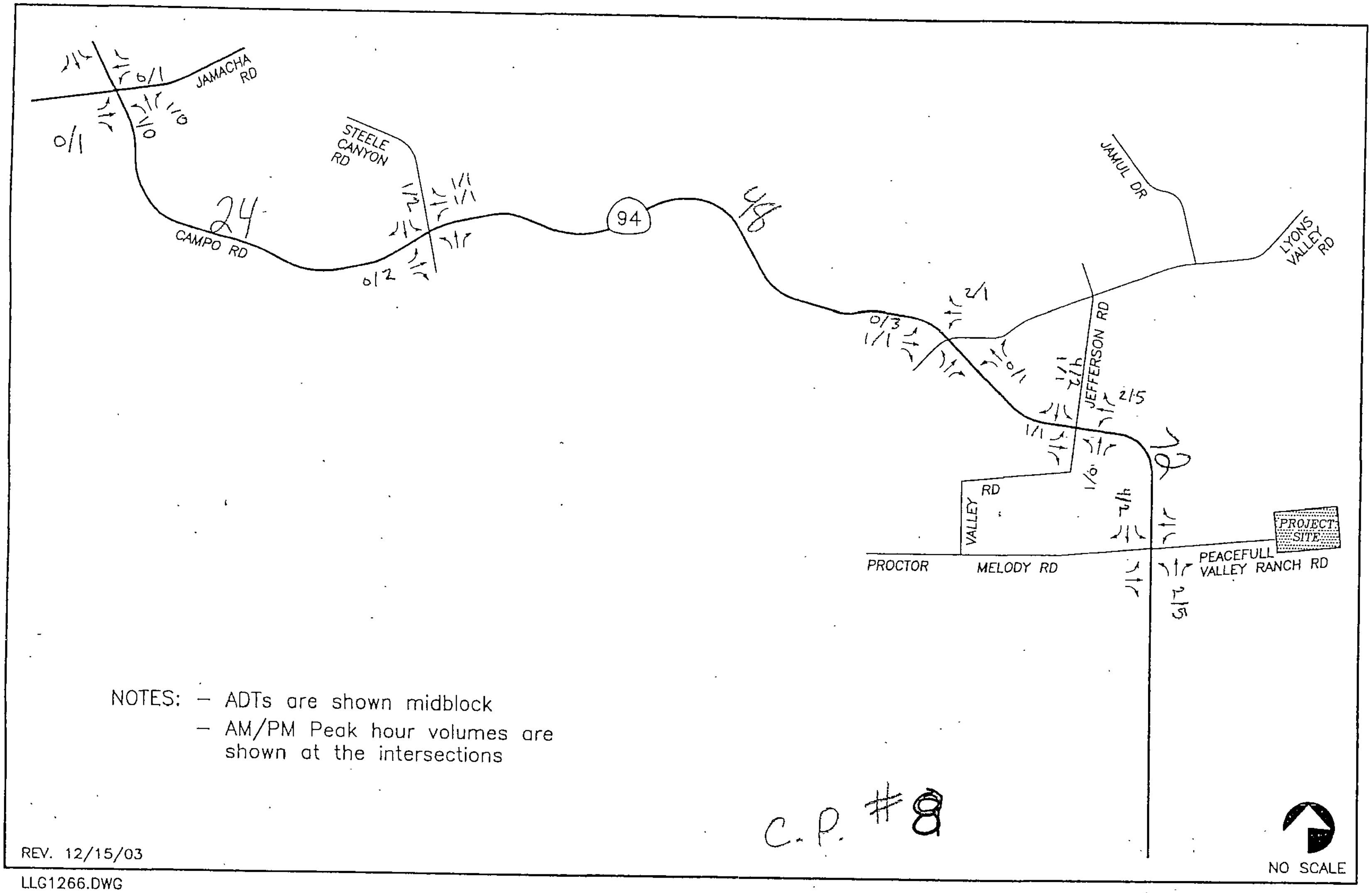
LINSCOTT LAW & GREENSPAN ENGINEERS

Yacoo Minor Subdivision (TPM 20628)

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



LLG1266.DWG

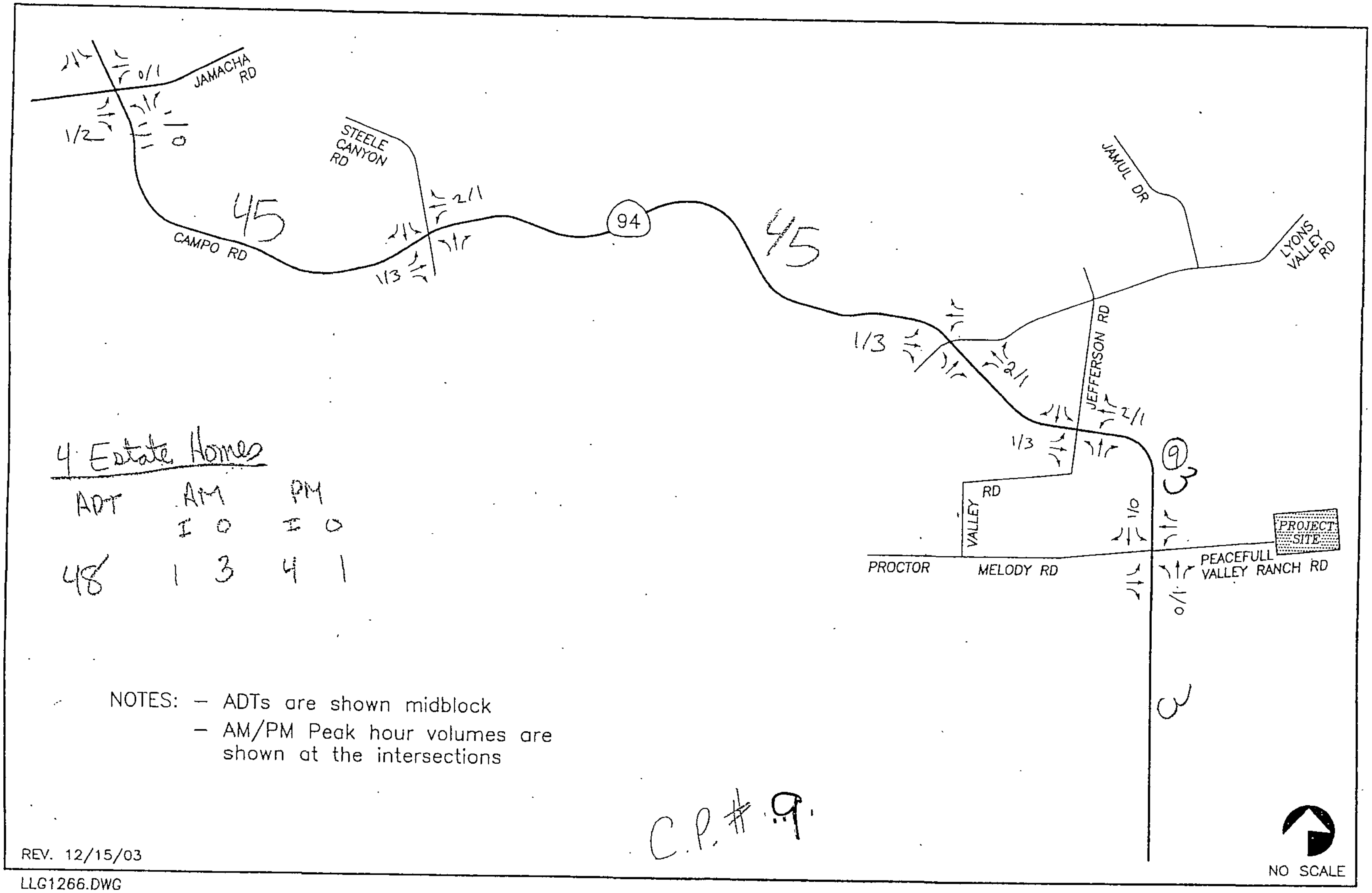
LINSCOTT LAW & GREENSPAN ENGINEERS

20 DU Residential development

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



4 Estate Homes

ADT	AM I	AM O	PM I	PM O
48	1	3	4	1

NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

C.P. # 9

REV. 12/15/03

LLG1266.DWG

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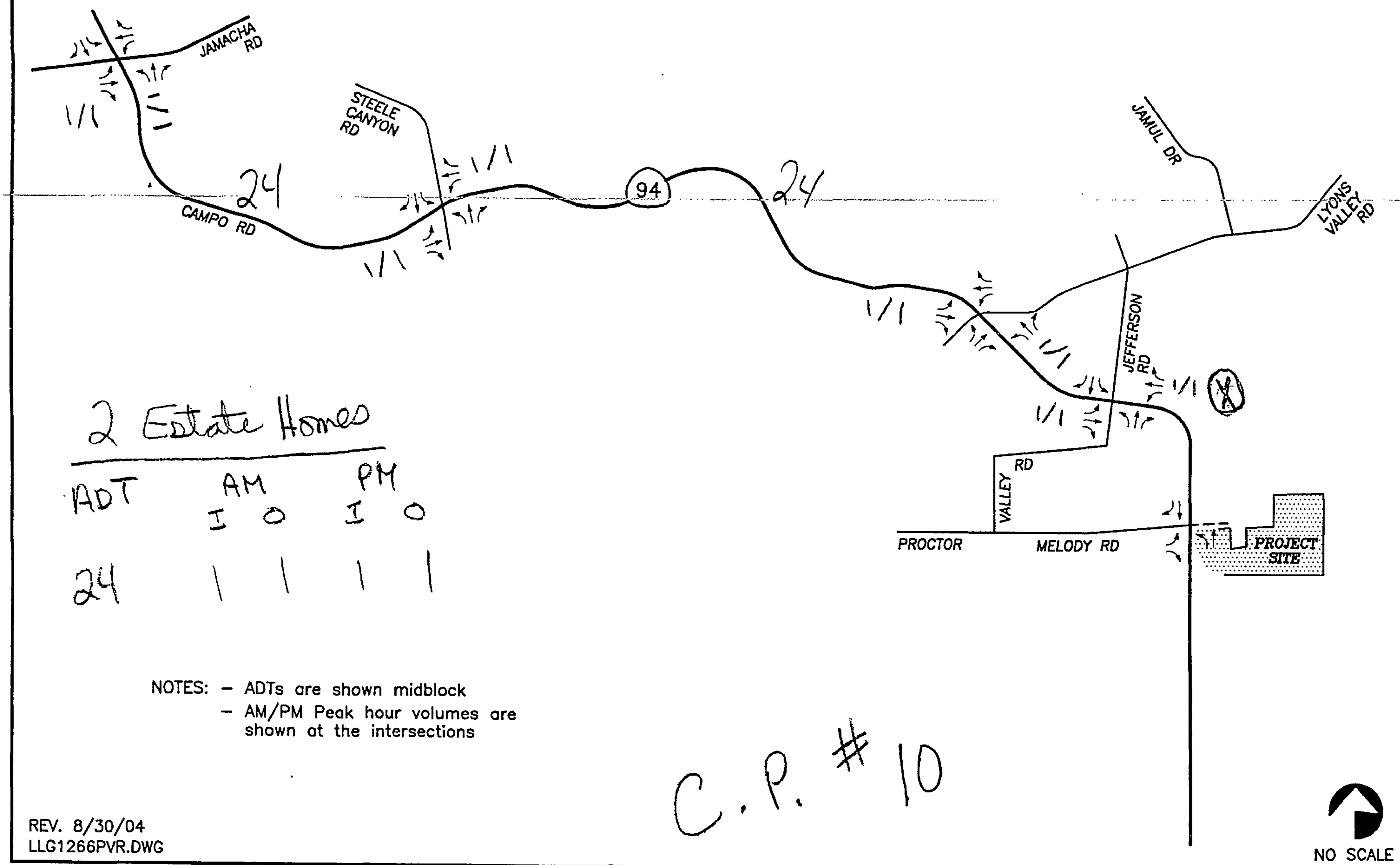
ENGINEERS

TPM 20599 RPL1

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



2 Estate Homes

ADT	AM I	AM O	PM I	PM O
24	1	1	1	1

NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

C.P. #10

REV. 8/30/04
LLG1266PVR.DWG

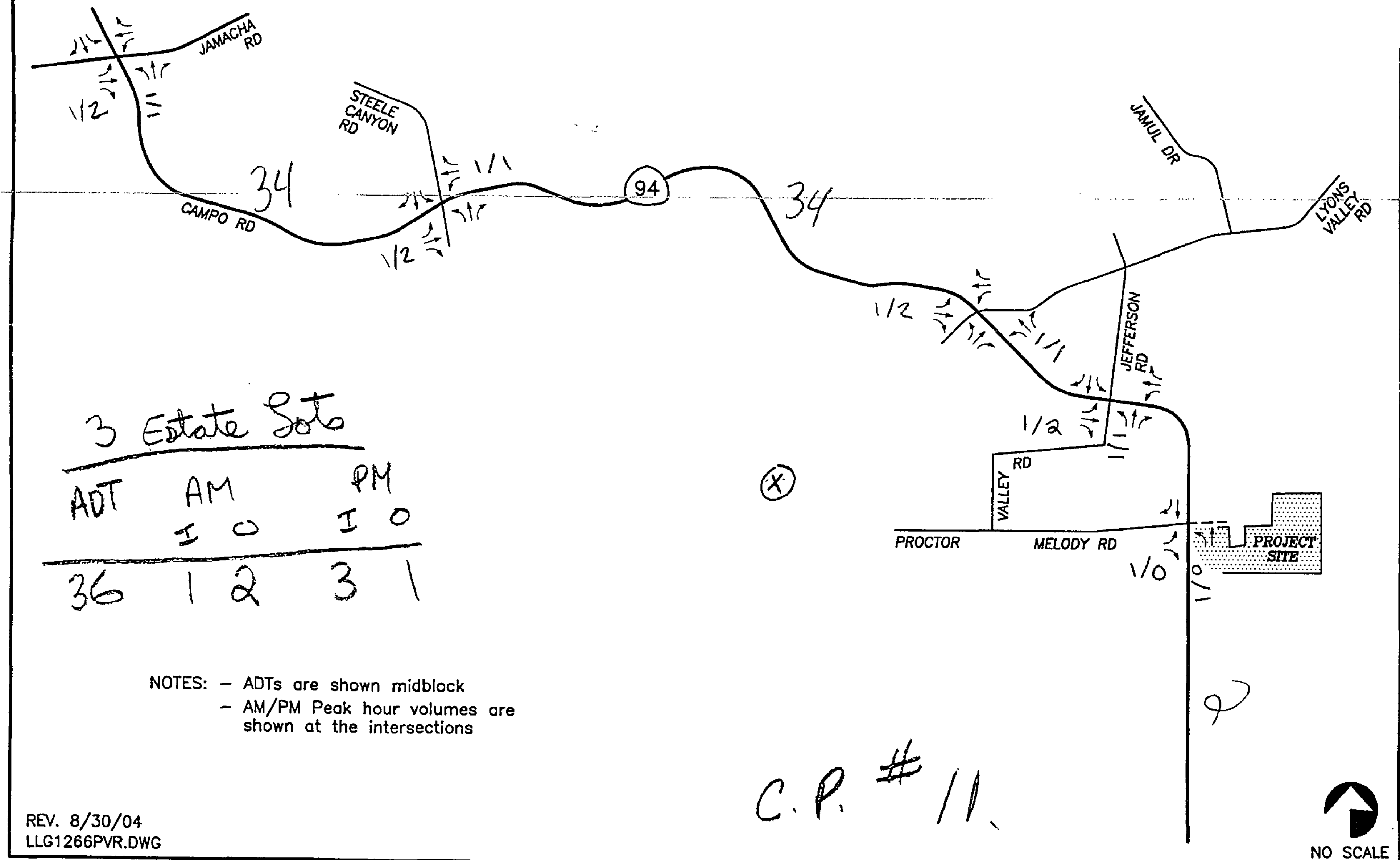
LINSCOTT LAW & GREENSPAN engineers

TPM 20868

Figure

~~TRAFFIC VOLUMES~~
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



3 Estate Lots

ADT	AM I	AM O	PM I	PM O
36	1	2	3	1

NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

C.P. #11.

REV. 8/30/04
LLG1266PVR.DWG

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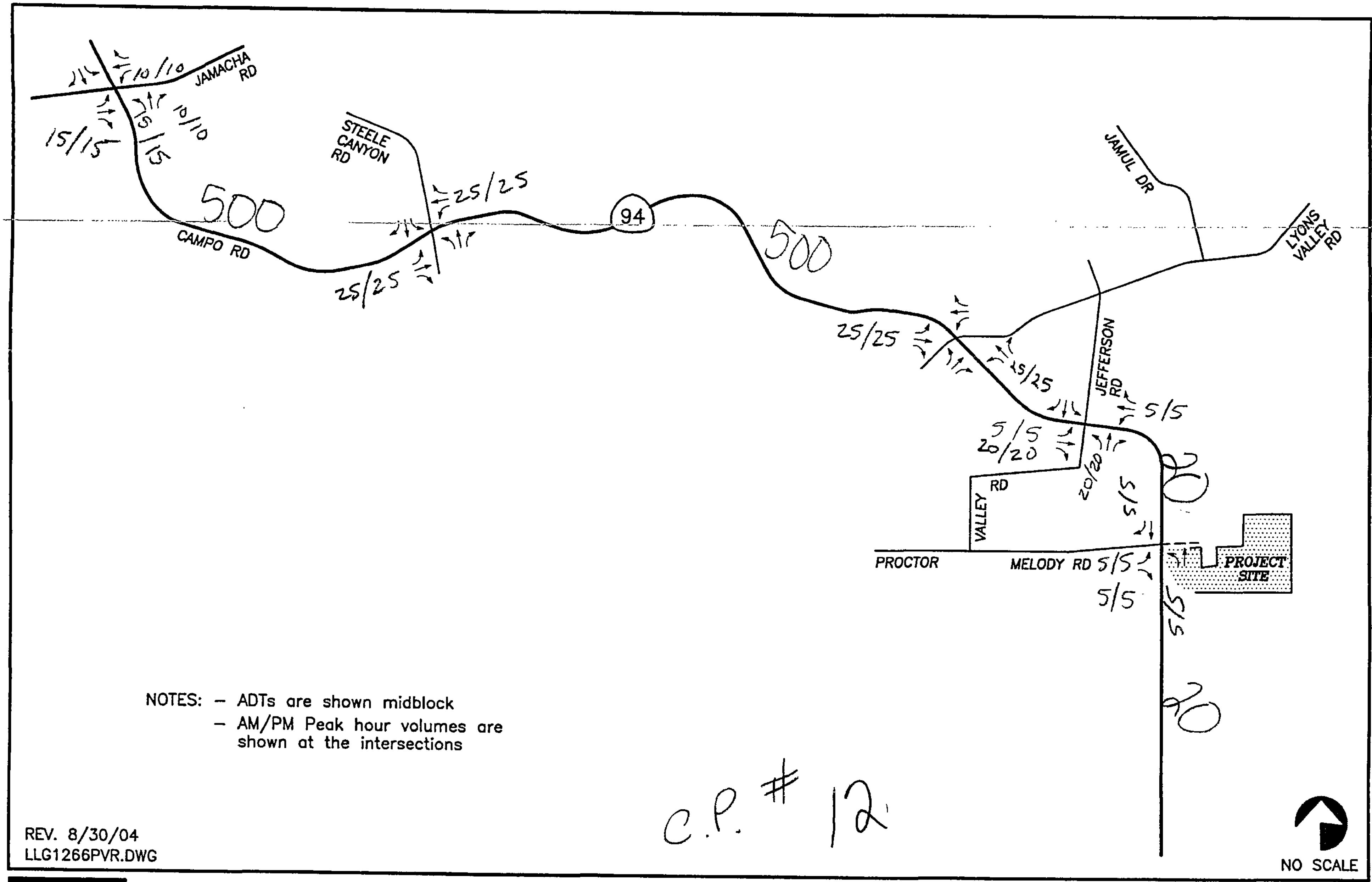
TPM 20594

Figure

~~TRAFFIC VOLUMES~~
AM/PM PEAK HOURS & ADTs
PEACEFUL VALLEY RANCH



LINSCOTT LAW & GREENSPAN engineers

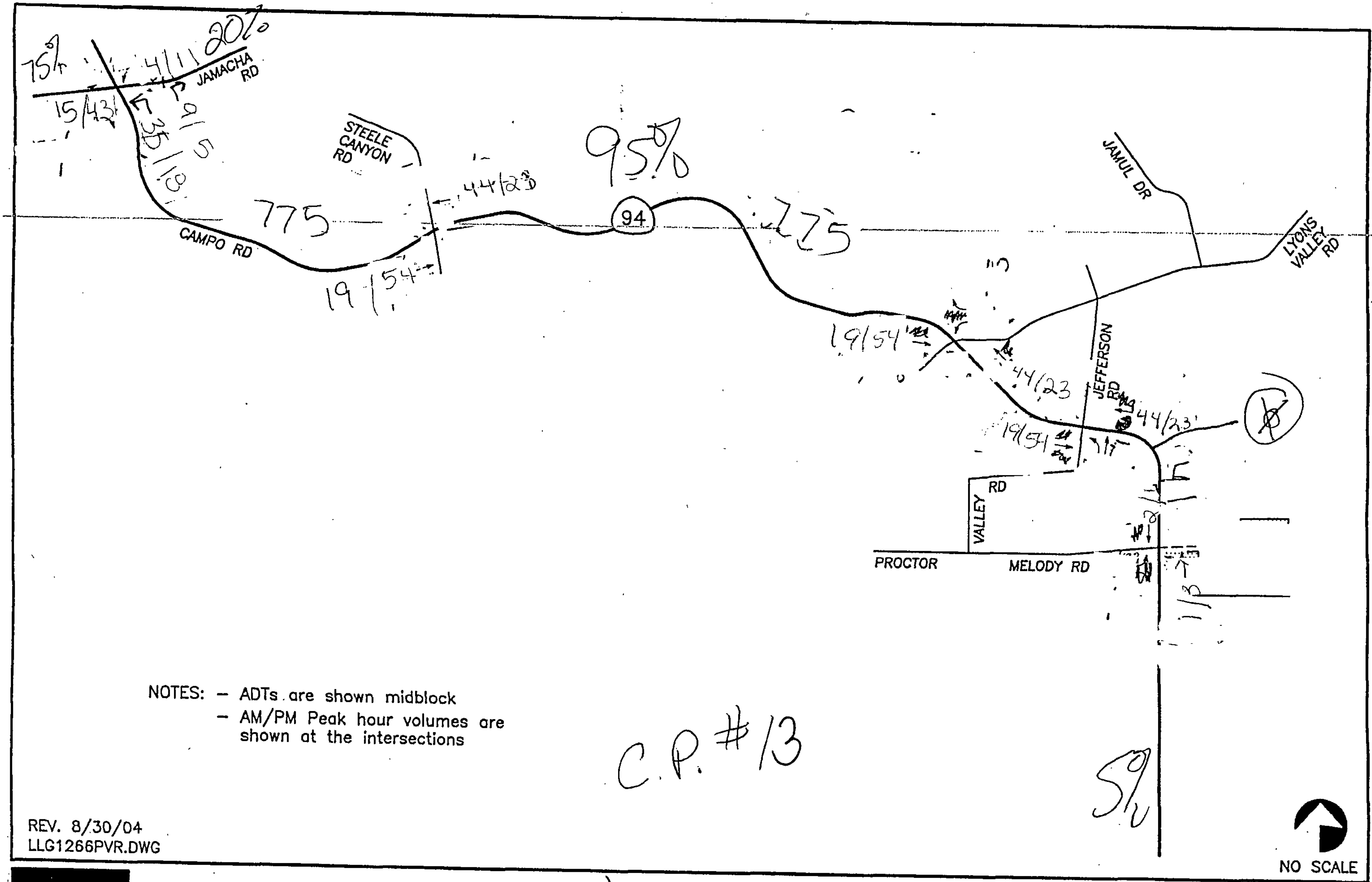
Otay Ranch - Village 19

Figure

~~TRAFFIC VOLUMES~~

AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



LINSCOTT LAW & GREENSPAN engineers

	IN	OUT
AM	20	46
PM	57	24

Cuml Project

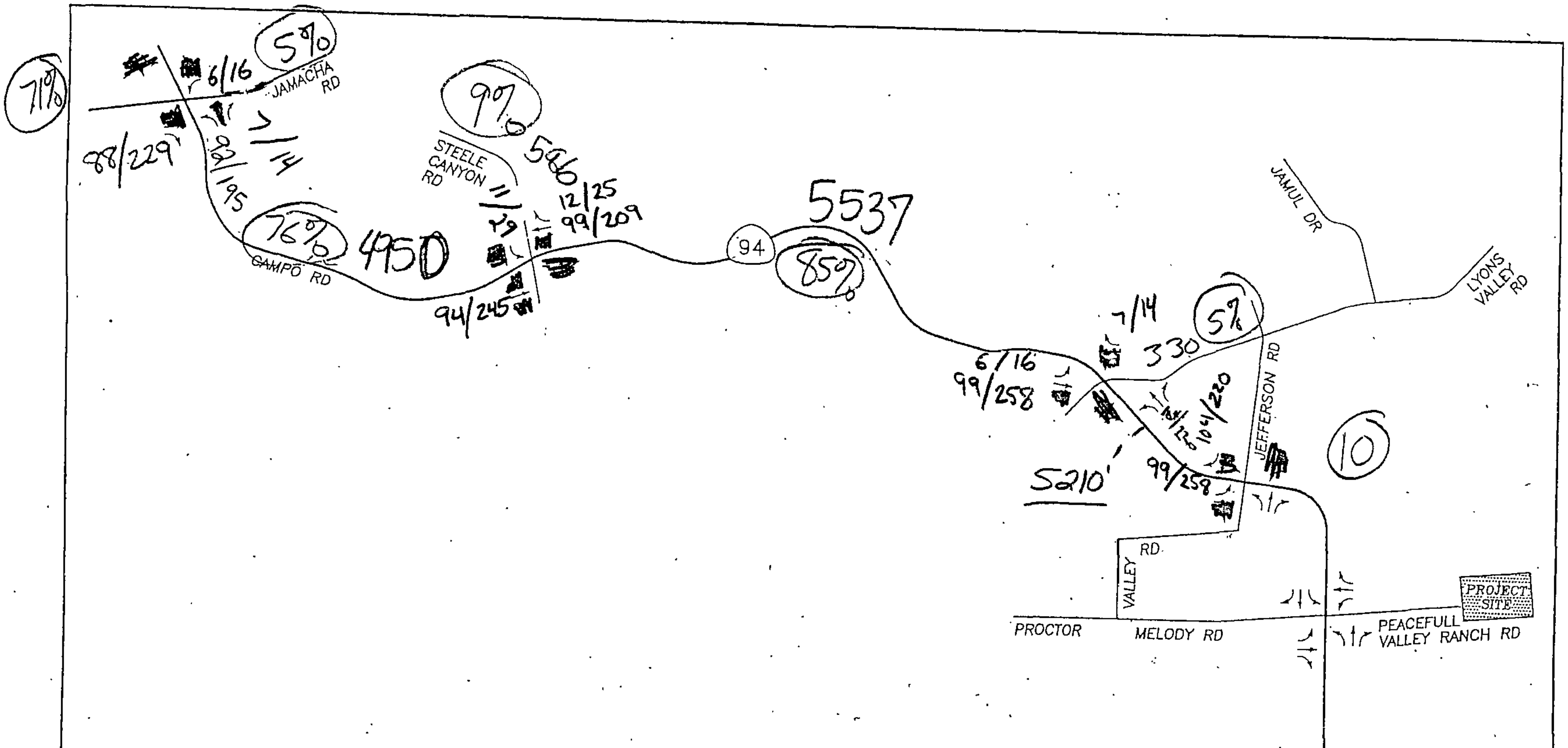
ADT = 814

Figure 9

~~TRAFFIC VOLUMES~~

AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections

C.P. # 14

REV. 12/15/03

LLG1266.DWG

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ENGINEERS

Simpson Farms

Figure

TRAFFIC VOLUMES
AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH

APPENDIX C

COUNTY OF SAN DIEGO DRAFT GUIDELINES FOR DETERMINING SIGNIFICANCE

COUNTY OF SAN DIEGO

GUIDELINES FOR DETERMINING SIGNIFICANCE

TRANSPORTATION AND TRAFFIC

LAND USE AND ENVIRONMENT GROUP

Department of Planning and Land Use
Department of Public Works

September 26, 2006

APPROVAL

I hereby certify that these **Guidelines for Determining Significance and Report Format and Content Requirements for Transportation and Traffic** are a part of the County of San Diego, Land Use and Environment Group's Guidelines for Determining Significance and Technical Report Format and Content Requirements and were considered by the Director of Planning and Land Use, in coordination with the Director of Public Works on the 26th day of September, 2006

GARY PRYOR
Director of Planning and Land Use

JOHN SNYDER
Director of Public Works

Attest ERIC GIBSON
Deputy Director of Planning and Land Use

I hereby certify that these **Guidelines for Determining Significance and Report Format and Content Requirements for Transportation and Traffic** are a part of the County of San Diego, Land Use and Environment Group's Guidelines for Determining Significance and Technical Report Format and Content Requirements and have hereby been approved by the Deputy Chief Administrative Officer (DCAO) of the Land Use and Environment Group on the 26th day of September, 2006 The Director of Planning and Land Use is authorized to approve revisions to these Guidelines for Determining Significance and Report Format and Content Requirements for Transportation and Traffic, except any revisions to Chapter 4 0 of the Guidelines for Determining Significance for Cultural Resources must be approved by the Deputy CAO

Approved, September 26, 2006

CHANDRA WALLAR
Deputy CAO

EXPLANATION

These Guidelines for Determining Significance for Traffic and information presented herein are used by County staff in their review of discretionary projects and environmental documents pursuant to the California Environmental Quality Act (CEQA). These Guidelines present a range of quantitative, qualitative, and performance levels for particular environmental effects. Normally, (in the absence of substantial evidence to the contrary), non-compliance with a particular standard stated in these Guidelines will usually mean the project will result in a significant effect, whereas compliance will normally mean the effect will be determined to be "less than significant." Section 15064(b) of the State CEQA Guidelines states:

> "The determination whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on factual and scientific data. An ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting."

These Guidelines assist in providing a consistent, objective and predictable evaluation of significant effects. These Guidelines are not binding on any decision-maker and should not be substituted for the use of independent judgment to determine significance or the evaluation of evidence in the record. The County reserves the right to request further, project specific, information in its evaluation of a project's environmental effects and to modify these Guidelines in the event a scientific discovery or factual data alters the common application of a Guideline. In addition, evaluations to verify the applicability of the significance guidelines for individual project conditions may be necessary. Additional evaluations may include analysis of vehicle headways, speeds, average gaps, queues, delay, or other factors.

LIST OF PREPARERS AND TECHNICAL REVIEWERS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF ATTACHMENTS

List of Acronyms

ADT	Average Daily Trips
CALTRANS	California Department of Transportation
CEQA	California Environmental Quality Act
CMP	Congestion Management Plan
DPLU	Department of Planning and Land Use
HCM	Highway Capacity Manual
ITE	Institute of Traffic Engineers
LOS	Level of Service
min	Minute
mph	Miles per Hour
MTDB	Metropolitan Transit Development Board
NCTD	North San Diego County Transit District
PFE	Public Facilities Element
RTP	Regional Transportation Plan
SANDAG	San Diego Association of Governments
SANTEC	San Diego Traffic Engineers' Council
sec	Second
TIS	Traffic Impact Study
V/C	Volume to Capacity
VMT	Vehicle Miles Traveled

INTRODUCTION

This document provides guidance for evaluating adverse environmental effects that a proposed project may have on traffic. Specifically, this document addresses the following questions listed in the California Environmental Quality Act (CEQA) Guidelines, Appendix G, XV, Transportation/Traffic[1]:

Would the project:

a) Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?

b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways? Or individually or cumulatively worsen a road already exceeding the level of standard?[2]

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

f) Result in inadequate parking capacity?

g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?

Traffic and traffic-related impacts are major concerns for the San Diego Region. As population in the San Diego Region grows, traffic, as measured by average daily trips (ADT), also grows. Land development within the San Diego region contributes to growth in population and growth in traffic. The rate of land development, population and traffic growth has often outpaced the provision of needed transportation infrastructure to adequately accommodate the increased growth. As a result, traffic congestion is a common occurrence on many freeways, highways and arterials in the San Diego region.

[1] The State CEQA Guidelines, Appendix G, XV Transportation/Traffic list two other transportation/traffic related questions (c and e), which are not addressed in this document. Question c states, "Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in locations that results in substantial safety risks?" Question c is concerned with airport traffic safety and is addressed under the County's Guidelines for Determining Significance for Airport Hazards. Questions e states, "Would the project result in inadequate emergency access? Question e is addressed under the County's Guidelines for Determining Significance for Fire Protection Planning, which addresses the needs of emergency service providers (fire and sheriff, etc.), including emergency access requirements.

[2] The second part of this question has been added and is not included in Appendix G of the State CEQA Guidelines.

1.0 GENERAL PRINCIPLES AND EXISTING CONDITIONS

The population of the San Diego Region is projected to increase from approximately 2.9 million people today to about 3.9 million in the year 2030. As a result, the number of forecasted vehicle miles traveled (VMT) in the San Diego Region is projected to increase 50 percent from current levels. Road improvements will be needed to accommodate the anticipated growth in traffic; otherwise, traffic congestion will increase significantly.

1.1 Level of Service

As a means of measuring and evaluating traffic congestion, the concept of "level of service" was created. Level of service (LOS) is a quality of service measure that describes operational conditions on a transportation facility, such as a roadway or intersection. Levels of service are established based upon the driver's perspective. This service measure is a general overall measurement of several conditions such as speed and travel time, freedom to maneuver, traffic interruption, and comfort and convenience. Safety is an important concern but, typically, is not included in the measures that establish service levels.

Six LOS categories are defined for each type of facility. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and the driver's perception of those conditions. Methods for identifying levels of service vary based upon the type of transportation facility. Criteria for identifying levels of service on County of San Diego arterials are provided in the County of San Diego Public Road Standards. Methods of identifying levels of service for freeways, highways and intersections are provided in the Highway Capacity Manual (HCM). A detailed discussion of level of service and an excerpted table from the Public Road Standards is provided in Attachment A. Also, definitions of some key traffic terms are included in Attachment B.

Levels of service are used primarily to assess how substantial increases in vehicular traffic may affect traffic congestion on specific transportation facilities, such as freeways, arterials, and intersections. Procedures have also been established to adjust the evaluation to account for trucks, buses, grade and pedestrian volumes. Substantial traffic volume increase may also result in other traffic related impacts. Where applicable, evaluations should be made to assess the potential for traffic related impacts for the following items:

- Regional transportation facilities; including freeways, state highways and ramps
- Local circulation and road network
- Adequacy of existing roadway or intersection design features
- Access (both primary and secondary, as required)
- Alternative transportation modes; including pedestrians, bicyclists and transit

1.2 Traffic Impact Studies

In order to evaluate potential traffic impacts that may result from a specific project, traffic impact studies are often prepared. Traffic impact studies include estimates of the amount of traffic generated by the project, distributions of project traffic or redistributions of traffic caused by the project, assessments of potential traffic impacts, and when applicable, the identification of mitigation measures to alleviate project-related traffic impacts.

The agency responsible for final approval of a project's traffic study is the agency that has discretionary approval of the project. For most projects located in the unincorporated area of San Diego, the agency approving the traffic study would be the County of San Diego. However, coordination with other affected agencies is often necessary in the preparation of traffic impact studies. SANDAG is the agency responsible for the oversight of regional transportation planning. The California Department of Transportation (Caltrans) is the State agency responsible for planning, constructing and maintaining the State highway network. In addition to the County of San Diego, eighteen other municipalities within the San Diego Region are responsible for planning, constructing and maintaining local transportation networks within their respective areas of jurisdiction.

For more information on traffic impact studies refer to the County's Transportation and Traffic Report Format and Content Requirements.

1.3 Regional Transportation Plan

On March 28, 2003 the San Diego Association of Governments (SANDAG) Board adopted the 2030 Regional Transportation Plan (RTP). This plan establishes goals and policies for addressing the needs of the regional transportation network in the San Diego region. A needs assessment prepared in 1998, identified that 13 percent (77 of 600 directional-miles) of the San Diego Region's freeway system operated at LOS F, an unacceptable level of service. Although not documented in the report, many of the region's local arterials and highways are also operating at unacceptable levels of service.

The 2030 RTP also estimated that $42 billion dollars would be required to provide needed highway transit and local road projects. If implemented, these projects alone will not fully relieve existing and anticipated future congestion. As the region's population, employment and VMT increase, congestion will also increase unless additional transportation improvements are made. SANDAG is in the process of updating the RTP to address recent funding resources, such as the passage of TRANSNET, and to reflect more recent population and traffic projections. In this effort SANDAG has estimated that there are 29 deficient (LOS F) freeway segments with a total mileage of 117 miles. Additional road and highway improvements may be assumed in the updated plan.

1.4 Parking

Parking requirements in the County are usually addressed on the local level through standards set forth in the County of San Diego Zoning Ordinance, Parking Regulations, Sections 6750-6799 and the County of San Diego Off-Street Parking Design Manual (June 1985), which implements Section 6793(c) of the County Zoning Ordinance.

The purpose of the parking regulations is to provide functionally adequate, safe, convenient and aesthetically pleasing off-street parking and loading facilities for motor vehicles and bicycles. With the exception of certain urbanized areas in the unincorporated portion of San Diego County, the majority of proposed, discretionary land uses have more than sufficient area to feasibly satisfy County parking requirements.

When designing a parking area, the size, location, landscaping and fencing of vehicle and bicycle parking spaces must be considered. Minimum size, location, landscaping and fencing standards are included in the Zoning Ordinance and Off-Street Parking Design Manual. The most frequently applicable parking standards considered during project design are summarized below.

1.4.1 Size of Parking Spaces

The dimension of parking spaces varies depending on angle of parking (0°, 30°, 45°, 60°, or 90°), striping of spaces (single or double), and whether the parking is intended for compact, regular, or handicapped vehicles. Regular parking spaces that are not for parallel parking shall measure 8'-6" x 18'. Handicapped parking spaces that are not for parallel parking shall measure 14'x19'. Different striping plans may further reduce the width of regular and handicapped spaces, as identified in the Off-Street Parking Design Manual.

Most uses, particularly office and retail, also require motorcycle and bicycle spaces, typically at a ratio of 1.5 bicycle spaces for each 10 parking spaces. Where bicycle spaces are required there shall not be less than three spaces provided.

1.4.2 Location of Parking Spaces

Some zones require parking to observe certain setbacks. These standards are outlined in the Zoning Ordinance, Section 6787 and Off-Street Parking Design Manual, Location of Parking on Typical Lots. Generally the location of parking is designed to ensure a safe environment for drivers and passengers exiting a parked vehicle; to provide relatively convenient access to the driver's and passenger's destination; and to minimize indirect impacts to adjoining properties, including noise, visual and lighting impacts.

2.0 EXISTING REGULATIONS AND STANDARDS

The following list details the most significant regulations that address traffic impacts in California and the County of San Diego.

2.1 State Regulations and Standards

California Environmental Quality Act (CEQA)[3]
[http://ceres.ca.gov/topic/env_law/ceqa/guidelines/]
Under the California Environmental Quality Act (CEQA) lead agencies are required to consider traffic impacts when assessing the environmental impacts of proposed projects. CEQA requires discretionary projects to evaluate the effect projects may have of traffic circulation and other transportation related impacts.

2.2 Local Regulations and Standards

Public Facilities Element (Part XII) of the San Diego County General Plan
[http://ceres.ca.gov/planning/counties/San_Diego/plans.html]
The County of San Diego General Plan Public Facilities Element establishes policies and implementation measures regarding the assessment and mitigation of traffic impacts of new development. One of the goals of the Public Facilities Element (PFE) is to provide "A safe, convenient, and economical integrated transportation system including a wide range of transportation modes (PFE, page XII-4-18)." The PFE also identifies an objective in the Transportation Section to provide a "Level of Service C or better on County Circulation Element roads. (PFE, page XII-4-18)." The PFE, however, establishes LOS D as an off-site mitigation threshold for discretionary projects. When an existing Level of Service is already D, "a LOS of D may be allowed (PFE, page XII-4-18)." According to the PFE, projects that significantly increase congestion on roads operating at LOS E or LOS F must provide mitigation. According to the PFE, this mitigation can consist of a fair share contribution to an established program or project to mitigate the project's impacts. If impacts cannot be mitigated, the project will be denied unless a specific statement of overriding findings is made pursuant to Sections 15091 and 15093 of the State CEQA Guidelines to approve the project as proposed.

San Diego County Transportation Impact Fee (TIF) Program/Ordinance
The County of San Diego Board of Supervisors adopted a Transportation Impact Fee Ordinance (April 2005) for the unincorporated area of San Diego County. The ordinance enables the County to implement Transportation Impact Fee programs. The TIF program requires payment of fees that constitute a proposed project's fair share contribution towards the construction costs of the planned transportation facilities that are affected by the proposed development. The TIF fees are collected as a condition of approval of a subdivision or prior to issuance of a development permit, including and most typically a building permit.

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[3] Public Resources Code 21000-21178; California Code of Regulations, Guidelines for Implementation of CEQA, Appendix G, Title 14, Chapter 3, §15000-15387.

San Diego County Public Road Standards [http://www.sdcounty.ca.gov/dpw/land/rtelocs.htm]
These standards provide minimum design and construction requirements for public roads. Levels of service are established for Circulation Element roads. Levels of service are not applied with the non-Circulation Element residential roads. Target design capacities, however, have been identified for these roads.

San Diego County Private Road Standards [http://www.sdcounty.ca.gov/dpw/land/rtelocs.htm]
These standards provide minimum design and construction requirements for private roads. Levels of service are not established for private roads. Minimum design and construction requirements, however, are established based upon the projected average daily traffic (ADT) volume on the road.

SANDAG Standards - Congestion Management Program[4]
[http://www.sandag.org/uploads/publicationid/publicationid_736_1278.pdf]
State Proposition 111, passed by voters in 1990, established a requirement that urbanized areas prepare and regularly update a Congestion Management Program (CMP), which is a part of SANDAG's Regional Transportation Plan (RTP). The purpose of the CMP is to monitor the performance of the region's transportation system, develop programs to address near-term and long-term congestion, and better integrate transportation and land use planning. SANDAG, as the designated Congestion Management Agency for San Diego region, must develop, adopt and update the CMP in response to six specific legislative requirements further described in the report. SANDAG, local jurisdictions, and transportation operators (i.e., Caltrans, Metropolitan Transit Development Board (MTDB), North San Diego County Transit District (NCTD), etc.) are responsible for implementing and monitoring the CMP.

The CMP has five major components. One such component is a Land Use Analysis Program. Under this program, the CMP requires a review of large projects that generate 2,400 or more average daily trips or 200 or more peak hour trips. This review must assess impacts to state highways and regionally significant arterials. An excerpted list of these roadways from the CMP is included below. For further information refer to the CMP, Map 4-1 and Exhibit 4-1, pp. 27-28. A copy of the CMP can be obtained from SANDAG or online.

List of CMP System Roadways

CMP Freeways
Interstate 5: Orange County Line to U.S./Mexico Border
Interstate 8: Nimitz Boulevard to Imperial County Line
Interstate 15: Riverside County Line to I-5
Interstate 805: I-5 (North) to I-5 (South)
State Route 52: I-5 to SR 25
State Route 54: I-5 to Briarwood Road
State Route 56: I-5 to Carmel Valley Road and I-15 to Black Mountain Road
State Route 67: Mapleview Street to I-8

[4] Congestion Management Program Update, January 2003, San Diego Regional Planning Agency

State Route 78: I-5 to North Broadway
State Route 94: I-5 to Avocado Boulevard
State Route 125: SR 54 to SR 94
State Route 163: I-15 to I-5
State Route 905: Oro Vista Road to Otay Mesa Road

CMP Highways
State Route 54: I-8 to SR 94
State Route 67: SR 78 to Mapleview Valley
State Route 75: I-5 (North) to I-5 (South)
State Route 76: Coast Highway to SR 79
State Route 78: North Broadway to Imperial County Line
State Route 79: Riverside County Line to I-8
State Route 94: Avocado Boulevard to Old Highway 80
State Route 282: Alameda Boulevard to Orange Avenue

CMP Arterials
(1) Balboa Avenue: I-5 to I-15[5]
(2) Centre City Parkway: I-15 (North) to I-15 (South)
(3) Fletcher Parkway/Broadway/E. Main Street/Greenfield Drive: I-8 (West) to I-8 (East)
(4) La Jolla Village Drive/Miramar Road: I-5 to I-15
(5) Manchester Avenue/El Camino Real: I-5 to SR 76/Mission Avenue
(6) Nimitz Blvd./North Harbor Dr./Grape & Hawthorne Streets/Pacific Highway/Harbor Drive: I-8 to I-5
(7) Olivenhain Road/Rancho Santa Fe Road: El Camino Real to SR 78
(8) Otay Mesa Road-Interim SR 905: SR 905 (West) to SR 905 (East)2
(9) Palomar Airport Road/San Marcos Boulevard: I-5 to SR 78
(10) Sea World Drive/Friars Road/Mission Gorge Road/Woodside Avenue: I-5 to SR 67
(11) Scripps Poway Parkway: I-15 to SR 67
(12) SR 54 & Sweetwater Road-Interim SR 125: I-805 to Broadway[6]

County of San Diego Zoning Ordinance, Parking Regulations, Sections 6750- 6799
[http://www.co.san-diego.ca.us/dplu/docs/z6000.pdf]
The County's Zoning Ordinance sets the standards for parking including requirements for new uses and structures; existing uses and structures; conversion, alterations, or expansion of an existing use or structure; computation of vehicle and bicycle space requirements; location of parking to building sites; parking space dimensions; design of bicycle storage; design standards for off-street parking; loading spaces; variances from parking regulations; and parking of commercial vehicles in residential, agricultural and certain special purpose zones.

[5] This CMP Arterial was formerly designated as CMP State Highway 274.
[6] These CMP Arterials are designated as interim facilities on the CMP network and will be replaced by a state highway following their construction.

County of San Diego Off-Street Parking Design Manual
[http://www.co.san-diego.ca.us/cnty/cntydepts/landuse/planning/zoning/ospdman.pdf]
The County of San Diego Off-Street Parking Design Manual implements Section 6793(c) of the County Zoning Ordinance. This section of the Ordinance relates to the design, dimensions, construction, landscaping, and surfacing of parking and bicycle spaces, and driveways.

2.3 Regional and Local Traffic Impact Analysis Guidelines

San Diego Traffic Engineers' Council (SANTEC) and the Institute of Traffic Engineers (ITE)
The San Diego Traffic Engineers' Council (SANTEC) and the local chapter of the Institute of Traffic Engineers (ITE) have endorsed for use the "Guidelines of Traffic Impact Studies (TIS) in the San Diego Region." These guidelines were prepared by a traffic subcommittee formed by SANDAG. The purpose of the subcommittee was to develop a model set of guidelines for the analysis of traffic impacts for adoption and use by the various jurisdictions in the San Diego region. The goal was to foster more consistency in the assessment of traffic impacts in the San Diego region. These guidelines establish a LOS target of LOS D. Impacts would be identified for those projects that significantly increase the volume and or delay at intersections and road segments operating below LOS D (i.e. at LOS E of LOS F) either prior to or as a result of the proposed project. These guidelines have been incorporated into an appendix of the Regional Congestion Management Program (CMP) that is formally adopted by SANDAG for use by local jurisdictions. These guidelines are often used as a guideline by many local traffic-engineering consultants in the preparation of traffic impact studies in the San Diego Region. These guidelines, however, do not provide specific direction regarding the assessment of cumulative traffic impacts, unsignalized intersections or consistency with recent changes in the CEQA guidelines that removed consideration of de minimus findings/effects.

California Department of Transportation (Caltrans)
The California Department of Transportation (Caltrans) has prepared a "Guide for the Preparation of Traffic Impact Studies." Objectives for the preparation of this guide include providing consistency and uniformity in the identification of traffic impacts generated by local land use proposals. In terms of level of service, Caltrans endeavors to maintain a goal of LOS C on State highway facilities. However, Caltrans acknowledges that this may not always be feasible. In these circumstances, Caltrans often accepts lower LOS on facilities that are currently operating below the LOS C objective.

City of San Diego
The City of San Diego has prepared a "Traffic Impact Study Manual." The purpose is to provide guidelines to consultants on how to prepare traffic impact studies in the City of San Diego and to ensure consistency on the preparation of these studies. Impacts are identified if the proposed project will increase the traffic volume on a road segment above an identified allowable increase. The better the initial level of service on the road segment, the higher the allowable volume increase.

3.0 TYPICAL ADVERSE EFFECTS

3.1 Traffic Congestion

Typical traffic related impacts are most often associated with traffic congestion on local roads and the regional circulation network. As the San Diego region grows, the number of vehicle trips that are generated by residents also grows. Historically, vehicle trips have been increasing at a faster rate than that of the population growth. It is forecasted that more than 16 million vehicle trips would be made in this region each weekday by the year 2030. The automobile is expected to remain the primary method of travel in the region, but new and widened freeways, increased trolley and bus service, better rail service, and additional highway improvements would alleviate some of the traffic congestion. SANDAG's 2030 RTP details some of the regional improvements that are projected to occur within a twenty-year time frame, but even with these improvements individual projects will continue to contribute to traffic congestion.

Traffic congestion usually affects level of service on roadway segments and at intersections and ramps, which in turn results in decreases in traffic flow on roadways and longer queues at intersections and ramps. These delays ad time to drivers daily commutes and can be noticeable impacts of traffic congestion.

3.2 Connectivity

The County's road network is connected by a variety of roadways, which allow drivers to travel throughout the County. However, at times there are physical limitations, such as steep topography, which partially constrain connectivity on existing roadways and preclude the construction on new roadway connections. In order to address connectivity issues alternative road networks to access potential connections may be required.

3.3 Hazards Due to an Existing Transportation Design Feature

Increased traffic generated or redistributed by a proposed project may cause a significant traffic operational impact to an existing transportation design feature and result in potential hazards. These hazards can occur due to a design features or physical configuration of existing or proposed access roads and can adversely affect the safe transport of vehicles along a roadway. The physical conditions of the project site and surrounding area, such as curves, slopes, walls, landscaping or other barriers, may also result in vehicle conflicts with other vehicles or stationary objects.

3.4 Hazards to Pedestrians or Bicyclists

Increased traffic generated or redistributed by a proposed project may cause a significant traffic operational impact to pedestrians or bicyclists and result in potential hazards. These hazards can occur for a variety reasons including:

- A design feature or physical configurations on a road segment or at an intersection that may adversely affect the visibility of pedestrians or bicyclists to drivers entering and exiting the site, and the visibility of cars to pedestrians and bicyclists;

- High amount of pedestrian activity at the project access points.

- Precluding or substantially hindering of the provision of a planned bike lane or pedestrian facility on a roadway adjacent to the project site.

- The physical conditions of the project site and surrounding area, such as curves, slopes, walls, landscaping or other barriers may result in vehicle/pedestrian, vehicle/bicycle conflicts.

- The project may result in a substantial increase in pedestrian or bicycle activity without the presence of adequate facilities.

3.5 Parking Capacity

Typical adverse effects on parking occur when an adequate number of spaces are not incorporated in a project design. The regulations are intended to require adequate off-street parking and loading, thereby reducing traffic congestion, allowing more efficient utilization of on-street parking, promoting more efficient loading operations, and reducing the use of public streets for loading purposes. Additionally, the regulations are intended to minimize the secondary effects of vehicles. These may include vehicular noise or visual impacts from headlights and unscreened parked vehicles. Unscreened parked vehicles are a particular concern when parking adjoins or is adjacent to residential areas or preserve systems that are sensitive to noise and lighting.

4.0 GUIDELINES FOR DETERMINING IMPACT SIGNIFICANCE

This section provides guidance for evaluating adverse environmental effects a project may have on traffic. The guidelines for determining significance are organized into eight categories: road segments, intersections, ramps, congestion management plan, hazards due to an existing transportation design feature, hazards to pedestrians or bicyclists, parking capacity, and alternative transportation. A discussion of how to evaluate project and cumulative level impacts is also included in the Transportation and Traffic Report Format and Content Requirement.

4.1 Road Segments

Pursuant to the County's General Plan Public Facilities Element (PFE), new development must provide improvements or other measures to mitigate traffic impacts to avoid:

(a) Reduction in Level of Service (LOS) below "C" for on-site Circulation Element roads;

(b) Reduction in LOS below "D" for off-site and on-site abutting Circulation Element roads; and

(c) "Significantly impacting congestion" on roads that operate at LOS "E" or "F". If impacts cannot be mitigated, the project will be denied unless a statement of overriding findings is made pursuant to the State CEQA Guidelines. The PFE, however, does not include specific guidelines/thresholds for determining the amount of additional traffic that would "significantly impact congestion" on such roads, as that phrase is used in item (c) above.

The County has created the following guidelines to evaluate likely traffic impacts of a proposed project for road segments and intersections serving that project site, for purposes of determining whether the development would "significantly impact congestion" on the referenced LOS E and F roads. The guidelines are summarized in Table 1. The thresholds in Table 1 are based upon average operating conditions on County roadways. It should be noted that these thresholds only establish general guidelines, and that the specific project location must be taken into account in conducting an analysis of traffic impact from new development.

On-site Circulation Element Roads

PFE, Transportation, Policy 1.1 states that "new development shall provide needed roadway expansion and improvements on-site to meet demand created by the development, and to maintain a Level of Service C on Circulation Element Roads during peak traffic hours". Pursuant to this policy, a significant traffic impact would result if:

- ***The additional or redistributed ADT generated by the proposed land development project will cause on-site Circulation Element Roads to operate below LOS C during peak traffic hours except within the Otay Ranch project as defined in the Otay Subregional Plan Text, Volume 2. PFE, Implementation Measure 1.1.2.***

Off-site Circulation Element Roads

PFE, Transportation, Policy 1.1 also states that "new development shall provide needed roadway expansion and improvements off-site to meet demand created

by the development, and to maintain a Level of Service D on Circulation Element Roads." "New development that would significantly impact congestion on roads operating at LOS E or F, either currently or as a result of the project, will be denied unless improvements are scheduled to improve the LOS to D or better or appropriate mitigation is provided." The PFE, however, does not specify what would significantly impact congestion or establish criteria for evaluating when increased traffic volumes would significantly impact congestion. The following significance guidelines provided are the County's preferred method for evaluating whether or not increased traffic volumes generated or redistributed from a proposed project will "significantly impact congestion" on County roads, operating at LOS E or F, either currently or as a result of the project.

Traffic volume increases from public or private projects that result in one or more of the following criteria will have a significant traffic volume or level of service traffic impact on a road segment, unless specific facts show that there are other circumstances that mitigate or avoid such impacts:

- ***The additional or redistributed ADT generated by the proposed project will significantly increase congestion on a Circulation Element Road or State Highway currently operating at LOS E or LOS F, or will cause a Circulation Element Road or State Highway to operate at a LOS E or LOS F as a result of the proposed project as identified in Table 1, or***

- ***The additional or redistributed ADT generated by the proposed project will cause a residential street to exceed its design capacity.***

Table 1
Measures of Significant Project Impacts to Congestion on Road Segments
Allowable Increases on Congested Road Segments

Level of service	Two-lane road	Four-lane road	Six-lane road
LOS E	200 ADT	400 ADT	600 ADT
LOS F	100 ADT	200 ADT	300 ADT

Notes:
1. By adding proposed project trips to all other trips from a list of projects, this same table must be used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project that contributes any trips must mitigate a share of the cumulative impacts.
2. The County may also determine impacts have occurred on roads even when a project's traffic or cumulative impacts do not trigger an unacceptable level of service, when such traffic uses a significant amount of remaining road capacity.

The first significance criterion listed in Table 1 addresses roadways presently operating at LOS E. Based on these criteria, an impact from new development on an LOS E road would be reached when the increase in average daily trips (ADT) on a two-lane road exceeds 200 ADT. Using SANDAG's "Brief Guide for Vehicular Traffic Generation Rates for the San Diego Region" for most discretionary projects this would generate less than 25 peak hour trips. On average, during peak hour conditions, this would be only one additional car every 2.4 minutes. Therefore, the addition of 200 ADT, in most cases, would result in changes to traffic flow that would not be noticeable to the average driver and therefore would not constitute a significant impact on the roadway. Significance criteria were also established for four-lane and six-lane roads operating at LOS E and are based upon the above 24 hour ADT significance criterion established for two-lane roads. The two-lane road criterion was doubled to determine impacts to four-lane roads and tripled to determine impacts to six-lane roads. This was considered to be conservative since the 24 hour per lane road capacity for a 4-lane road is more than double that of a two-lane road and the per lane capacity of a six-lane road is more than triple that of the two-lane road. For LOS E roads, the additional significance criteria are 400 ADT for a four-lane road and 600 ADT for a six-lane road. Similar to criterion for two-lane roads, the 400 ADT for a 4-lane road and 600 ADT for a 6-lane road criteria would generate less than 25 per lane peak hour trips for most discretionary projects. On average, during peak hour conditions, this would be only one additional car per lane every 2.4 minutes. The addition of 200 ADT per lane (400 ADT for a 4 lane road or 600 ADT for a 6 lane road) , in most cases, would result in changes to traffic flow that would not be noticeable to the average driver and therefore would not constitute a significant impact on the roadway. Road capacities based upon level of service for County roads (two-lane, four-lane and six-lane) are provided in Attachment A.

The second significance criteria listed in Table 1 addresses roadways presently operating at LOS F. Under LOS F congested conditions, small changes and disruptions to the traffic flow on County Circulation Element Roads can have a greater effect on traffic operations when compared to other LOS conditions. In order to better account for potential effects of increased traffic on LOS F roads more stringent significance criteria was established when compared to that for LOS E. Based on this guidance, an impact from new development on an LOS F road would be reached when the increase in average daily trips (ADT) on a two-lane road exceeds 100. Again, using SANDAG's "Brief Guide for Vehicular Traffic Generation Rates for the San Diego Region" for most discretionary projects this would generate less than 12.5 peak hour trips. On average, during peak hour conditions, this would be only one additional car every 4.8 minutes. The addition of 100 ADT, in most cases, would not be noticeable to the average driver and therefore would not constitute a significant impact on the roadway. The same approach used to determine significance criteria for four-lane and six-lane roads operating at LOS E was used to determine appropriate significance criteria for four-lane and six-lane roads operating at LOS F. Based on this approach, the significance criteria for a four-lane road (200 ADT) and for a six-lane road (300 ADT) would generate less than 12.5 per lane peak hour trips for most discretionary projects. On average, during peak hour conditions, this would be only one additional car per lane every 4.8 minutes. The addition of 100 per lane ADT (200 ADT for a 4-lane road and 300 ADT for a 6-lane road) would, in most cases, not be noticeable to the average driver and therefore would not constitute a significant impact on the roadway. In summary, under extremely congested LOS F conditions, small changes and disruptions to the traffic flow can significantly affect traffic operations and additional project traffic can increase the likelihood or frequency of these events. Therefore, the LOS F ADT significance criteria was set at 100 ADT (50% of the LOS E threshold) to provide a higher level of assurance that the traffic allowed under the threshold would not significantly impact traffic operation on the road segment.

Non-Circulation Element Residential Streets

Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots and not to carry through traffic, however, for projects that will substantially increase traffic volumes on residential streets, a comparison of the traffic volumes on the residential streets with the recommended design capacity must be provided. Recommended design capacities for residential non-Circulation Element streets are provided in the San Diego County Public and Private Road Standards. Traffic volume that exceeds the design capacity on residential streets may impact residences and should be analyzed on a case-by-case basis.

4.2 Intersections

This section provides guidance for evaluating adverse environmental effects a project may have on signalized and unsignalized intersections.

4.2.1 Signalized

Traffic volume increases from public or private projects that result in one or more of the following criteria will have a significant traffic volume or level of service traffic impact on a road segment:

- ***The additional or redistributed ADT generated by the proposed project will significantly increase congestion on a signalized intersection currently operating at LOS E or LOS F, or will cause a signalized intersection to operate at a LOS E or LOS F as identified in Table 2.***

Table 2
Measures of Significant Project Impacts to Congestion on Intersections
Allowable Increases on Congested Intersections

Level of service	Signalized	Unsignalized
LOS E	Delay of 2 seconds	20 peak hour trips on a critical movement
LOS F	Delay of 1 second, or 5 peak hour trips on a critical movement	5 peak hour trips on a critical movement

Notes:
1. **A critical movement is one that is experiencing excessive queues.**
2. **By adding proposed project trips to all other trips from a list of projects, these same tables are used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project that contributes any trips must mitigate a share of the cumulative impacts.**
3. **The County may also determine impacts have occurred on roads even when a project's traffic or cumulative impacts do not trigger an unacceptable level of service, when such traffic uses a significant amount of remaining road capacity.**

The significance criterion for signalized intersections identified in Table 2 allows an increase in the overall delay at an intersection operating at LOS E of two seconds. This is consistent with the capacity threshold contained in the SANDAG's CMP and guidelines established by the City of San Diego. A delay of two seconds is a small fraction of the typical cycle length for a signalized intersection that ranges between 60 and 120 seconds. The likelihood of increased queues forming due to the additional two seconds of delay is low. Therefore, an increased wait time of two seconds, on average, would result in changes to traffic flow that would not be noticeable to the average driver. Therefore the significance guideline for intersections operating at LOS E is 2 seconds.

The primary significance criterion for signalized intersections operating at LOS F conditions was based upon increased delay at the intersection. Under LOS F congested conditions, small changes and disruptions to the traffic flow to signalized intersections can have a greater effect on overall intersection operations when compared to other LOS conditions. In order to better account for potential effects of increased traffic at signalized intersections operating at LOS F, a more stringent guideline was established when compared to signalized intersection operating at LOS E. A significance guideline of an increased delay of 1 second was established for signalized intersections operating at LOS F. An increase in the overall delay at an intersection of one second, on average, would result in changes to traffic flow that would not be noticeable to the average driver. Therefore the significance guideline for intersections operating at LOS F is 1 second.

Signalized intersections operating at LOS F also have the potential for substantial queuing at specific turning movements that may detrimentally effect overall intersection and/or road segment operations. Thus, an increase of peak hour trips to a critical move was also established as a secondary significance criterion for signalized intersections. A critical movement would be a movement or a lane at an intersection that is experiencing queuing or substantial delay and is affecting the overall operation of the intersection. The increase in peak hour trips to a critical move is a measurement of how many cars can be added to an existing queue. The addition of five trips (peak hour) per critical movement will normally be considered a significant impact. This significance criterion was selected because the five additional trips spread out over the peak hour would not significantly increase the length of an existing queue and would not be noticeable to the average driver (one trip every 12 minutes or 720 seconds). For LOS E intersections, the 5 peak hour trips to a critical movement would not be noticeable to the average driver since the one additional trip during the 12 minute interval on average would clear the traffic signal cycles well within the 12 minute period. It should also be noted that if the 5 additional peak hour trips arrived at the same time these trips would also clear the traffic cycle and existing queue lengths would be re-established.

4.2.2 Unsignalized

The operating parameters and conditions for unsignalized intersections differ dramatically from those of signalized intersections. Very small volume increases on one leg or turn and/or through movement of an unsignalized intersection can substantially affect the calculated delay for the entire intersection. Significance criteria for unsignalized intersections are based upon a minimum number of trips added to a critical movement at an unsignalized intersection.

Traffic volume increases from public or private projects that result in one or more of the following criteria will have a significant traffic volume or level of service traffic impact on a road segment:

- ***The additional or redistributed ADT generated by the proposed project will add 20 or more peak hour trips to a critical movement of an unsignalized intersection, and cause an unsignalized intersection to operate below LOS D, or***

- ***The additional or redistributed ADT generated by the proposed project will add 20 or more peak hour trips to a critical movement of an unsignalized intersection currently operating at LOS E, or***

- ***The additional or redistributed ADT generated by the proposed project will add 5 or more peak hour trips to a critical movement of an unsignalized intersection, and cause the unsignalized intersection to operate at LOS F, or***

- ***The additional or redistributed ADT generated by the proposed project will add 5 or more peak hour trips to a critical movement of an unsignalized intersection currently operating at LOS F, or***

- ***Based upon an evaluation of existing accident rates, the signal priority list, intersection geometrics, proximity of adjacent driveways, sight distance or other factors, it is found that the generation rate is less than those specified above, and would significantly impact the operations of the intersection.***

The significance guidelines for unsignalized intersections identify a minimum number of trips added to a critical movement at an unsignalized intersection. Since the operations of unsignalized intersections under congested conditions are heavily influenced by traffic volume increases on critical moves, the significance guidelines for unsignalized intersections were based upon the number of trips added to a critical movement. This guideline directly relates to the number of vehicles that can be added to an existing queue that forms at the intersection. A significance criteria of twenty trips (peak hour) per critical movement was used for LOS E conditions. Although delays drivers experience under LOS E condition may be noticeable, they are not yet considered unacceptable. The twenty trips spread out over the peak hour would not likely cause the intersection delay or existing queue lengths to become unacceptable. The twenty trips (peak hour) would not be noticeable to the average driver. A significance guideline of five trips (peak hour) per critical movement was used for LOS F conditions. The five trips spread out over the peak hour would not significantly increase the length of an existing queue and would not be noticeable to the average driver.

The operations of unsignalized intersections under congested conditions are heavily influenced by traffic volume increases on critical moves. Therefore, the significance guidelines for unsignalized intersections are based upon the number of peak hour trips added to a critical movement at that intersection. This guideline examines the number of vehicles that may be added to an existing queue that forms at the intersection by the additional traffic generated by a project. In LOS E situations, the delays that drivers experience are noticeable, but are not considered excessive. A peak hour increase of twenty trips to the critical movement of an unsignalized intersection would be, on average, one additional car every 3.0 minutes or 180 seconds. Assuming the average wait time for a vehicle in the critical movement queue is less than 3.0 minutes, which is typical for LOS E condition, this would not be noticeable to the average driver and would not be considered a significant impact.

For LOS F conditions, a significance threshold of five trips (peak hour) per critical movement was used. The five trips spread out over the peak hour would not significantly increase the length of an existing queue and would not be noticeable to the average driver. Five trips spread out over an hour would be one car every 12 minutes. This typically exceeds the average wait time in the queue and would not be noticeable to the average driver.

4.3 Ramps

Additional or redistributed ADT generated by the proposed project may significantly increase congestion at a freeway ramp. Caltrans' "Guide for the Preparation of Traffic Impact Studies" states that an operational analysis based upon Caltrans Highway Design Manual should be used in the evaluation of the ramps and in the preparation of the operational analysis that Caltrans' Ramp Metering Guidelines should be used. However, specific criteria for the determination of an impact at a ramp are not provided in the above documents.

The CMP includes guidelines for the determination of traffic impacts at a ramp. These guidelines are summarized in Table 3. Table 3 may be used as a guide in determining significant increases in congestion on ramps and for addressing congestion management plan impacts. Other factors that may be considered include ramp metering, location (rural vs. urban), ramp design, and the proximity of adjacent intersections. Coordination with Caltrans and the local jurisdiction should be conducted to determine appropriate impact criteria for the specific ramps being assessed.

4.4 Congestion Management Plan

Projects that generate over 2,400 ADT or 200 peak hour trips, must comply with the traffic study requirements of SANDAG's Congestion Management Plan. Trip distributions for these projects must also use the current regional computer traffic model. Projects that must prepare a CMP analysis should also follow the CMP traffic impact analysis guidelines. A summary of these guidelines is provided in Table 3.

Table 3
Measure of Significant Project Traffic Impacts for Circulation Element Roads, Signalized Intersections, and Ramps

Level of Service With Project	Allowable Change Due to Project Impact						
	Freeways		Roadway Segments*		Intersections**	Ramps***	Ramps with >15 min. delay
	V/C	Speed (mph)	V/C	Speed (mph)	Delay (sec.)	Delay (min.)	Delay (min.)
E & F	0.01	1	0.02	1	2	-	2

* For County arterials, which are not identified in SANDAG's Regional Transportation Plan and Congestion Management Plan as regionally significant arterials, significance may be measured based upon an increase in average daily trips. The allowable change in ADT due to project impacts in this instance would be identified in Table 1.

** Signalized intersections.

*** See the Transportation and Traffic Report Format and Content Requirements for guidance on ramp metering analysis.

KEY

V/C	=	Volume to Capacity ratio
Speed	=	Speed measured in miles per hour
Delay	=	Average stopped delay per vehicle measured in seconds, or minutes
LOS	=	Level of Service
ADT	=	Average Daily Trips

4.5 Hazards Due to an Existing Transportation Design Feature

Many roadways and intersections in the County were designed and constructed prior to the adoption of current road design standards. The design of the roadways and intersections, while adequate for existing traffic volumes, may pose an increased risk if traffic volumes substantially increase along the road segment or at the intersection as a result of the proposed project. Increased traffic generated or redistributed by a proposed project may cause a significant traffic operational impact to an existing transportation design feature. Therefore, it is necessary to evaluate potential hazards to an existing transportation design feature.

The determination of significant hazards to an existing transportation design feature shall be on a case-by-case basis, considering the following factors:

- Design features/physical configurations of access roads may adversely affect the safe transport of vehicles along the roadway.

- The percentage or magnitude of increased traffic on the road due to the proposed project may affect the safety of the roadway.

- The physical conditions of the project site and surrounding area, such as curves, slopes, walls, landscaping or other barriers, may result in vehicle conflicts with other vehicles or stationary objects.

- The project does not conform to the requirements of the private or public road standards, as applicable.

4.6 Hazards to Pedestrians or Bicyclists

Many roadways and intersections in the County do not have pedestrian or bicycle facilities. The roadways and intersections, while adequate for current conditions, may pose an increased risk if traffic volumes, pedestrian volumes, or bicycle volumes substantially increase along the road segment or at the intersection, as a result of the proposed project. Increased traffic generated or redistributed by a proposed project may cause a significant traffic operational impact to pedestrians or bicyclists. Therefore, it is necessary to evaluate potential hazards to pedestrians or bicyclists.

The determination of significant hazards to pedestrians or bicyclists shall be on a case-by-case basis, considering the following factors:

- Design features/physical configurations on a road segment or at an intersection that may adversely affect the visibility of pedestrians or bicyclists to drivers entering and exiting the site, and the visibility of cars to pedestrians and bicyclists.

- The amount of pedestrian activity at the project access points may adversely affect pedestrian safety.

- The project may result in the preclusion or substantial hindrance of the provision of a planned bike lane or pedestrian facility on a roadway adjacent to the project site.

- The percentage or magnitude of increased traffic on the road due to the proposed project may adversely affect pedestrian and bicycle safety.

- The physical conditions of the project site and surrounding area, such as curves, slopes, walls, landscaping or other barriers may result in vehicle/pedestrian, vehicle/bicycle conflicts.

- The project does not conform to the requirements of the private or public road standards, as applicable.

- The project may result in a substantial increase in pedestrian or bicycle activity without the presence of adequate facilities.

4.7 Parking Capacity

The following significance guideline will be considered a potentially significant parking capacity impact.

- ***The project cannot demonstrate compliance with the standards set forth by the County of San Diego Zoning Ordinance (Sections 6750-6799) and the County of San Diego Off-Street Parking Design Manual.***

Urban planners set minimum parking requirements for every land use type. These requirements are designed to ensure that land developers will provide enough spaces to satisfy the peak demand for parking to the subject use. The requirements are typically listed in a jurisdiction's zoning ordinance and this is the case in the County of San Diego, with a supplemental Off-Street Parking Design Manual. The establishment of minimum standards in the Zoning Ordinance is primarily based on surveys of nearby cities and consultation with professional traffic engineering association publications, such as the Institute of Transportation Engineers (ITE) handbooks. Identifying an adequate number of peak hour parking spaces for each use is not an exact science and there is no uniform formula or origin of minimum parking requirements (Shoup, 1999). Instead minimum parking standards have been developed through a trial and error process to identify the appropriate minimum standards for the subject jurisdictions. The County of San Diego practiced this same technique when parking minimum parking standards were last updated in 1985. Based on the continued fine-tuning of minimum parking standards, non-compliance with the County of San Diego Zoning Ordinance and Off-Street Parking Design Manual will result in a potentially significant impact.

4.8 Alternative Transportation

Alternative transportation is addressed in the County's General Plan Public Facilities Element (PFE). The County's stated objective for alternative transportation is addressed by the PFE, Objective 4. Objective 4 asks for a "Reduction in the demand on the road system through increased public use of alternate forms of transportation and other means." Pursuant to Objective 4, Policies 4.1 – 4.4 establish a means for the County to meet the objective. As such, if a proposed project is not in conformance with the applicable alternative transportation policies in the PFE, a significant conflict with the County's alternative transportation policies may occur.

5.0 STANDARD MITIGATION AND PROJECT DESIGN CONSIDERATIONS

If a proposed project's traffic results in a significant traffic impact (as per the criteria specified above), mitigation for the traffic impact must be proposed, unless mitigation is infeasible pursuant to CEQA. Potential mitigation measures can include traffic signal improvements, physical road improvements, street re-striping and parking prohibitions, fair share contributions toward identified and scheduled projects, and transportation demand management programs. A variety of possible generalized mitigation measures are provided below. Consult with County staff, as necessary, for further information. Conceptual striping plans to ensure feasibility of the proposed mitigation measures may be required.

5.1 Traffic Signal Improvements

- New Signal (provided that it meets traffic signal warrants)
- Signal modifications including signal timing, coordination, phasing improvements, etc.

5.2 Physical Road Improvements

- Turn Restrictions
- New Roadway
- Curve Realignment
- Roadway widening to add lanes or shoulders
- Provision of pathway or sidewalk
- Extension of truncated street
- Redesign of freeway on- and off-ramps
- Median construction/modification to restrict access
- Flaring of intersections to add turn lanes
- Provision of passing lanes or turnouts
- Acceleration and deceleration lanes
- Removal of obstructions (vegetation, rock outcroppings, utilities, etc.)
- Roundabouts

5.3 Street Re-striping and Parking Restrictions

- Re-striping to add lanes with or without parking removal or restrictions
- Protected left-turn pockets, or free right turn lanes
- Parking restrictions, daily or during peak hours

5.4 Fair Share Contributions

- Payment of the County's Traffic Impact Fee (cumulative impacts only)
- To approved road projects identified in the County's Capital Improvement Plan
- To traffic signals identified in the County's Traffic Signal Plan

5.5 Transportation Demand Management*

- Flexible or staggered work hours
- Traffic control measures
- Transit incentives and improvements including subsidized transit passes, bus turnouts, or bus shelters/benches
- Carpool, vanpool programs and participation in a computerized matching system

* Implementation of these measures will require monitoring on an on-going basis.

5.6 Traffic Safety/Hazards to Pedestrians or Bicyclists

If traffic safety or pedestrian/bicycle safety impacts are present, then conditions are placed on a project prior to approval to address those concerns. Often, compliance with County of San Diego Public or Private Road Standards will provide sufficient mitigation for an identified impact. However, site specific mitigation measures, such as the improvement of sight distance along the frontage of a project, will be imposed as a condition of approval. Conceptual striping plans to ensure feasibility of the proposed mitigation measures may be required.

Projects that would generate a high demand for pedestrian traffic such as schools, shopping centers, and large office parks should identify likely pedestrian and bicycle routes to the facilities and identify needed facilities to accommodate the pedestrian demand.

Bicycle lanes and routes designated on the County's General Plan must be specified and existing facilities identified. Provisions to provide/accommodate the ultimate right-of-way needed to construct designated bike lanes must be incorporated into the proposed project. Construction of bicycle lanes may be based upon the demand and connections to existing facilities in the area and input from the local community planning/sponsor group.

5.7 Parking Capacity

There is no standard mitigation for projects that propose an inadequate amount of parking spaces. Demonstration of compliance with the County Zoning Ordinance requirements is mandatory prior to approval of a discretionary land use project, unless a variance has been granted; therefore, there should be no adverse impact that would require mitigation. Typically, a project will not be approved if an inadequate amount of parking spaces are proposed.

5.8 Alternative Transportation

Alternative transportation is addressed in the County's General Plan Public Facilities Element (PFE), Policies 4.1 – 4.4. The PFE identifies several viable ways of promoting alternative transportation and to reduce demand on the road system. However, many of these solutions are programmatic in nature and cannot typically be implemented by an individual project. Program level solutions include establishing incentive programs for employers to encourage their employees to use alternative transportation and coordinating the planning and development of transit centers with other jurisdictions and public transportation agencies. Project level solutions include identifying the need for transit improvements for large scale projects and conditioning new development on the dedication and construction of bikeways as indicated in the Circulation Element's Bicycle Network.

6.0 REFERENCES

California Department of Transportation, Guidelines for the Preparation of Traffic Impact Studies, May 18, 2000.

California Public Resources Code, California Environmental Quality Act (PRC §21000-21178).

City of Los Angeles, Draft L.A. CEQA Thresholds Guideline, Section F, Transportation, Section F.1 through F.8. Unadopted document, May 14, 1998.

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Guidelines for the Implementation of the California Environmental Quality Act. Pages 115-118. Department of Planning and Land Use. Unadopted document, August 1991.

Off-Street Parking Design Manual, June 1985.

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Zoning Ordinance (Parking Regulations, Sections 6706, 6750 through 6799)

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San Diego Traffic Engineers' Council (SANTEC) and the Institute of Transportation Engineers (ITE). SANTEC/ITE Guidelines for Traffic Impact Studies (TIS) in the San Diego Region (draft), March 2, 1999.

Shoup, Donald C. The Trouble with Minimum Parking Requirements, December 9, 1999.

[Attachment A]

LEVELS OF SERVICE SUMMARY

Background

Level of Service

Level of service (LOS) is a quality of service measure that describes operational conditions on a transportation facility, such as a roadway or intersection. This service measure is a general overall measurement of several conditions such as speed and travel time, freedom to maneuver, traffic interruption, comfort and convenience.

Six LOS categories are defined for each type of facility. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and the driver's perception of those conditions. Safety is not included in the measures that establish service levels.

Each transportation facility type has one or more of service measure that serves as the primary determinant of level of service for that facility type. This LOS-determining parameter is called the service measure or sometimes the measure of effectiveness (MOE). The MOE will vary from facility type to facility type. For instance, for intersections the MOE will be delay; for a road segment it may be the 24-hour volume, the volume to capacity ratio, speed or travel time along the facility.

Capacity

The capacity of a facility is the maximum number of persons or vehicles that can be expected to traverse a point or uniform section of road within a specified time frame under prevailing roadway, traffic and control conditions. Theoretically, this is the point in which the flow rate (vehicles/hour) on the facility is the highest. At lower traffic volumes, the peak hour operations will be low density with higher speeds. At higher traffic volumes, the peak hour operations will be of higher density, but at lower speeds. The flow rate can be measured in 15 minute, hourly or 24-hour intervals. Some general relationships/estimates have been established/assumed for converting from 24-hour average daily traffic measurements to peak hour measurements and vice-versa.

The highest volume attainable under LOS E defines the capacity of the arterial or collector. Operating conditions at capacity are unstable and difficult to predict. If this capacity is exceeded, operating conditions on the roadway change dramatically. Average travel speeds are extremely low, stop-and-go traffic occurs and excessive queuing may be present.

The capacity is related to level of service. The LOS E/LOS F threshold is identified as the capacity of the facility (roadway or intersection). Volumes to capacity ratios are calculated based upon this capacity (LOS E/LOS F) threshold.

Roadways

Roadways are classified based upon the roadway's function, control conditions and type roadside development, including its specific use, density and intensity. Road classifications for roadways located within the unincorporated area are described in the County of San Diego's General Plan Circulation Element and in the County of San Diego Public Road Standards. The road classifications provided therein may be grouped into four categories, arterials, collectors, residential roads and industrial/commercial roads. A description of each category and the method of determining LOS for each are discussed below:

Freeways

A freeway is defined as a divided highway with full control of access and two or more lanes for the exclusive use of traffic in each direction. Freeways provide uninterrupted flow. There are no signalized or stop-controlled intersections and direct access to and from adjacent property is not permitted. Access to the freeway is limited to ramp locations. Raised barriers, at-grade medians or continuous raised medians separate opposing directions of travel.

Operating conditions on a freeway primarily result from interactions among vehicles and drivers. Although speed is a major concern of drivers as related to service quality, freedom to maneuver within the traffic stream and proximity to other vehicles are equally noticeable concerns. These qualities are related to the density of the traffic stream. Unlike speed, density increases up to capacity.

The LOS criteria for freeways are defined to represent reasonable ranges in the three critical flow variables, speed, density and flow rate. They are as follows:

LOS A describes free flow operations. Free flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver in the traffic stream. The effects of incidents or point breakdowns are easily absorbed at this level.

LOS B represents reasonably free flow and free flow speeds are maintained. The ability to maneuver in the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents and point breakdowns are still easily absorbed.

LOS C provides for flow with speeds at or near the free flow speed. Freedom to maneuver is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but the local deterioration in service will be substantial. Queues may be expected to form behind any significant blockage.

LOS D is the level at which speeds begin to decline slightly with increasing flows and density begins to increase somewhat more quickly. Freedom to maneuver is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels. Even minor incidents can be expected to create queuing, because the traffic stream has little space to absorb disruptions.

LOS E describes operations at capacity, the highest density value. Operations at this level are volatile, because there are virtually no usable gaps in the traffic stream. Vehicles are closely spaced, leaving little room to maneuver. Speeds still exceed 49 mph. At capacity the traffic stream has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown with excessive queuing. Maneuverability in the traffic stream is extremely limits and the level of physical and psychological comfort afforded the driver is poor.

LOS F describes breakdowns in vehicular flow. Such conditions generally exist within queues forming behind breakdown points. These may occur for a number of reasons, such as traffic incidents, merges, and lane drops. The breakdowns occur when the ratio of existing demand to actual capacity (or of forecasted demand to estimated capacity) exceed 1.00.

The level of service for freeway segments is estimated by calculating the demand to capacity or volume to capacity ratio. It is based upon the peak 15 min traffic flow as expressed in vehicles per hour. Adjustments to account for the types of vehicle in the traffic flow are provided in the HCM. Adjustments to the capacity to account for geometrics, grade and environmental factors, such as adverse weather conditions, are also provided.

Two-Lane Highways

A two-lane highway is a two-lane undivided roadway with one lane for each direction of travel. Traffic signals are spaced over two miles apart along the highway. Passing a slower vehicle requires the use of the opposing lane as sight distance and gaps are available. As volumes and geometric restrictions increase, the ability to pass decreases and platoons form. Motorists in platoons are subject to delay because they are unable to pass.

Many two-lane highways are located within the County of San Diego unincorporated area. These are primarily State highways such as SR 67, SR 76, SR 78 and SR 94. For State highways Caltrans design standards, which utilize a peak hour HCM analysis, is used. This methodology estimates traffic operations based upon terrain, geometric design and traffic conditions. Base conditions for terrain and geometric design have been identified which are applicable for most route segments. Procedures to account for segments, which differ from the base conditions, are also provided. The methodology is typically applied to highway segments at least 2 mile long.

In the HCM two-lane highways are categorized into two classes for analysis;

Class I – These are two-lane highways on which motorists expect to travel at relatively high speeds. These include major intercity routes connecting major traffic generators, daily commuters, or primarily links in the state or national highway network. They serve long distance trips or serve as connecting links between facilities that serve long trips.

Class II - These are two-lane highways on which motorists do not necessarily expect to travel at high speeds. They function as access routes to Class I facilities, serve as scenic/recreational routes or pass through rugged terrain. They often serve short trips, the beginning or ending portion of a longer trip or trips for which sightseeing/recreation plays a significant role.

The primary measures of level of service for Class I two-lane highways are percent time following and average travel speed. For Class II two-lane highways level of service is based only upon time spent following. Levels of service criteria of two-lane highways are defined based upon the peak period (15 min flow periods) and are intended for application to segments of significant length. They are defined as follows:

LOS A describes the highest quality of service, when motorists are able to travel at their desired speed. Without strict enforcement average speeds of 55 mph would be expected on Class I two-lane highways and platoons of three or more vehicles are rare. On Class II two-lane highways speeds may fall below 55 mph but motorists will not be delayed in platoons more than 40 % of their travel time.

LOS B characterizes traffic flow with speeds of 50 mph (slightly higher on level terrain), on Class I two-lane highways, and drivers are delayed in platoons up to 50 percent of the time. On Class II two-lane highways speeds may fall below 50 mph but motorists will not be delayed in platoons more than 55 % of their travel time.

LOS C describes further increases in traffic flow, resulting in noticeable increases in platoon formation, platoon size and frequency of passing impediments. The average speed still exceeds 45 mph on level terrain Class I two-lane highways. Although traffic flow is stable it is susceptible to congestion due to turning vehicles and slow-moving traffic. Percent time following may reach 65 %. On Class II two-lane highways speeds may fall below 45 mph but motorists will not be delayed in platoons more than 70 % of their travel time.

LOS D describes unstable flow. The two opposing traffic streams begin to operate separately and passing becomes extremely difficult. Turning vehicles and roadside distractions may cause disruptions to the traffic stream. The average speed of 40 mph can still be maintained on Class I two-lane highways, under base conditions, but mean platoon sizes of 5 to 10 vehicles are common. On Class II two-lane highways speeds may fall below 40 mph but motorists will not be delayed in platoons more than 85 % of their travel time.

LOS E traffic flow conditions have a percent time following greater than 80% for Class I two-lane highways and greater than 85% on Class II two-lane highways. Speeds may drop below 40 mph on Class I highways and may be as low as 25 mph on sustained grades. Passing is virtually impossible. Platooning becomes intense as slower vehicles or other interruptions are encountered.

LOS F represents heavily congested flow and speeds are highly variable.

The highest volume attainable under LOS E defines the capacity of the two-lane highway. Generally, this is 3,200 peak hour trips in both directions. Operating conditions at capacity are unstable and difficult to predict.

Arterials and Collectors

Arterials are roadways that primarily serve longer through trips. Providing access to abutting commercial and residential land uses is also an important function of arterials. Traffic signals are, typically, located at many intersections with public roads and major access points to adjacent land uses. Collectors are roadways provide both land access and traffic circulation. Their access function is more important than that of arterials and unlike arterials their operations is not always dominated by traffic signals.

On arterials, which are predominately uninterrupted on segments between major intersections, the Highway Capacity Manual 2000 evaluation method for Urban Streets may be used. Average travel speed on the road way is used as the determinant of operating LOS. The average travel speed is related to the traffic volume on the road. Exhibit 10-7 in the HCM 2000 provides a service volume Table that contains approximate hourly volumes and corresponding level of service estimates for different roadway types. Typically, the capacity of arterials, which have few interruptions between major intersections, is limited by the capacity of the intersections along the roadway.

The Highway Capacity Manual 2000 includes a method for evaluating level of service for urban streets. Urban streets are identified in the HCM 2000 as arterials with traffic signals spaced two miles or less apart. The HCM methodology primarily assesses the travel speed and level of service of the urban street based upon the operations and delay that occurs at the intersection along the urban street. A roadway's access function, however, is not assessed/included in this methodology. The level of access provided by a roadway should also be considered in evaluating its performance.

Most County arterials and collectors have frequent interruptions between major intersections. Capacity and level of service for arterials and collectors in the County of San Diego are usually determined based 24-hour average daily traffic according to Table 2 in the County of San Diego Standards for Public Roads. The 24-hour average daily traffic volumes are identified for each LOS category. They were based upon historical operations of County roads, comparisons with standards from other jurisdictions, and comparison with Highway Capacity Manual tables/guidelines. They account for both mobility and access along the roadway. They are derived based upon average conditions and should be revised to account for special circumstances, such as reduced lane width, extreme grades and the provision of access improvements including turn lanes and acceleration/deceleration lanes. It should also be noted that, although not proportional to peak hour traffic volumes, the 24 hour ADT is often related to the peak hour volume. When the 24-hour volume is significantly increased, the peak hour volume is also typically significantly increased.

The following statements characterize LOS along arterials and collectors:

LOS A describes primarily free flow operations. Vehicles are completely unimpeded in their ability to maneuver into and within the traffic stream. Average travel speeds are approximately 90 % of the free flow speed. The free flow speed is the theoretical speed of traffic when no vehicles are present.

LOS B describes reasonably unimpeded traffic operations. The ability to maneuver into and within the traffic stream is only slightly restricted. Average travel speeds are approximately 70 % of the free flow speed.

LOS C describes stable operations. The ability to maneuver and change lanes in midblock locations may be more restricted than at LOS B. Average travel speeds are approximately 50 % of the free flow speed.

LOS D borders on a range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. The ability to maneuver into and within the traffic stream is limited with slight and infrequent delay. Average travel speeds are approximately 40 % of the free flow speed.

LOS E is characterized by significant delays. The ability to maneuver into and within the traffic stream is extremely limited. Average travel speeds are approximately 33 % or less than the free flow speed.

LOS F is characterized by high delays. Average travel speeds are extremely low with stop-and-go traffic or excessive queuing.

The highest volume attainable under LOS E defines the capacity of the arterial or collector. Operating conditions at capacity are unstable and difficult to predict. If this capacity is exceeded, operating conditions on the roadway change dramatically. Average travel speeds are extremely low, stop-and-go traffic occurs and excessive queuing may be present. Generally, the highest LOS E capacity for County arterials and collectors is identified in Table 1 of the County of San Diego Public Road Standards.

Residential Roads

Residential roads are provided to collect traffic from adjacent residential areas and lots. Their primary purpose is to provide a limited residential area access to and from the regional road network. Such roads are not envisioned to provide through traffic generated in one community and destined for another. They are designed to accommodate local traffic.

Levels of service are not applied to residential roads. Due to the abutting and surrounding residential land uses, reduced traffic volumes are desired in order to minimize real and or perceived impacts to the adjacent uses. Residential roads are targeted to serve between 1,500 and 4,500 average daily trips (ADT). The County also has some special residential roads, which include frontage, alley and hillside residential. Due to the unique nature of these roads traffic may be less than 1500 ADT. Traffic volumes in excess of these targets may be accepted if other means of access to an area is precluded or found to be impractical due to such factors as environmental impacts, engineering, and no other legal access for an area.

Industrial/Commercial Roads

Industrial/Commercial roads provide access to abutting lots zoned for industrial and commercial uses. Their primary purpose is to provide a limited industrial/commercial area access to and from the regional road network. Such roads are not envisioned to provide through traffic generating in one community and destined for another. They are designed to accommodate a high percentage of trucks.

Levels of service are not applied to industrial/commercial roads. Due to the abutting and surrounding industrial/commercial land uses, reduced traffic volumes are desired in order to minimize real and or perceived impacts to the adjacent uses. Two-lane industrial/commercial roads are targeted to serve and 4,500 average daily trips. Four lane industrial/commercial roads are recommended for traffic volumes greater than 4,500 ADT. Traffic volumes in excess of 4,500 ADT may be accepted on two lane industrial/commercial road adequate abutting lot access improvements are provided or other means of access to an area is precluded or found to be impractical due to such factors as environmental impacts, engineering, and no legal access.

Intersections

Levels of service for intersection are estimated based upon the procedures provided in the HCM 2000. The HCM includes procedures for the analysis of signalized and unsignalized intersections. Capacity and traffic analysis focus on the peak hour of traffic volume, because it represents the most critical period for operations and has the highest capacity requirements. Since the flow rate can fluctuate substantially within the peak hour, assessments based upon the peak 15-minute flow rate are used. A discussion of these procedures is provided below.

Signalized Intersections

The analysis of signalized intersection is based upon a wide variety of prevailing traffic, roadway and signalization conditions. Traffic conditions include volumes on each approach, distribution of vehicles by movement (left, through, right), the vehicle type distribution, pedestrian cross flows and other factors. Roadway conditions include basic geometrics of the intersection, such as the number and width of through lanes, the number and width of turn lanes, grades and adjacent parking lanes. Signalization conditions include signal phasing, timing, type of control and other factors.

The maximum capacity at signalized intersections is defined for each lane group. The lane group capacity is the maximum hourly rate of vehicles that can reasonably pass through the intersection. The flow rate is generally measured for a 15 min period and is stated in vehicles per hour (veh/hr). Capacity is evaluated in terms of the ratio of demand flow rate to maximum capacity (v/c ratio).

In the HCM methodology the capacity, LOS, and other performance measures are estimated for lane groups and intersection approaches. The overall LOS is also estimated for the intersection as a whole. The methodology, however, does not take into account the potential impact of downstream congestion of the intersection. Nor does the methodology detect and adjust for the impacts of left turn pocket overflows on through traffic and intersection operation.

Levels of service for signalized intersections are defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic and incidents. Although the control delay is estimated based upon a number of variables, for a given set of signal conditions the v/c ratio is a lead parameter of control delay. LOS for signalized intersections are estimated based upon a calculation of the v/c ratio, which is used with other factors to estimate the control delay.

Levels of service for signalized intersections are defined to represent reasonable ranges in control delay as follows:

LOS A describes operations with low control delay, up to 10 sec/vehicle. Many vehicles do not stop at all.

LOS B describes operations with control delay greater than 10 and up to 20 sec/vehicle. More vehicles stop than at LOS A, causing higher levels of control delay.

LOS C describes operations with control delay greater than 20 and up to 30 sec/vehicle. Individual cycle failures may begin at this level. Cycle failures occur when a given green phase does not serve all queued vehicles and overflows occur. The number of vehicles stopping is noticeable, though many still pass through the intersection without stopping.

LOS D describes operations with control delay greater than 35 and up to 55 sec/vehicle. At LOS D the influence of congestion becomes more noticeable. Many vehicles stop and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with control delay greater than 55 and up to 80 sec/vehicle. Individual cycle failures are frequent.

LOS F describes operations with control delay greater than 80 sec/vehicle. This level is considered unacceptable to most drivers. It often occurs when the arrival flow rates exceed the capacity of lane groups. Many individual cycles fail.

Unsignalized Intersections

Two-Way Stop-Controlled Intersections (TWSC)
Levels of service procedures are provided in the HCM for two-way stop-controlled (TWSC) intersections. Level of service for TWSC intersections is determined by estimating the control delay for each minor movement. The delay is estimated by determining the amount of available acceptable gaps for a driver to maneuver from and to the minor street. LOS is not defined for the intersection as a whole.

The LOS criteria for TWSC intersections are somewhat different from that of signalized intersections primarily because of different driver perceptions. The expectation is that a signalized intersection is designed to carry higher traffic volumes and experience greater delay than unsignalized intersections. LOS F occurs when there are not enough gaps of sufficient size to allow the minor street demand to safely cross through traffic on the major street. This is typically evident by extremely long control delays experienced by minor-street traffic. Drivers on the minor street may also start accepting smaller than usual gaps. In such cases safety may be a problem and some disruption of the major street traffic may occur.

All-Way Stop-Controlled Intersections (AWSC)
Levels of service procedures are provided in the HCM for all-way stop-controlled (AWSC) intersections. Level of service for AWSC intersections is determined by estimating the control delay per vehicle for each lane and each approach. The LOS for each approach and for the intersection as a whole is then estimated by computing weighted averages of the delay.

The LOS criteria for TWSC intersections are similar to that of signalized intersections. The criteria for LOS for AWSC intersections, however, have different threshold values than that for signalized intersections. The expectation is that a signalized intersection is designed to carry higher traffic volumes and experience greater delay than unsignalized intersections. A higher level of control delay is acceptable at a signalized intersection for the same LOS.

Roundabouts

The HCM manual includes procedures to estimate the capacity of single-lane roundabouts. It, however, does not include procedures for estimating the LOS of a roundabout. The capacity analysis is based upon gap acceptance techniques. The procedures are not applicable to multilane roundabouts. More details regarding the use and experience of roundabouts in the Untied States are needed before an analysis procedure for multilane roundabouts will be provided in the HCM.

TABLE 1

AVERAGE DAILY VEHICLE TRIPS

CIRCULATION ELEMENT ROADS		LEVEL OF SERVICE				
CLASS	**X-SECTION**	**A**	**B**	**C**	**D**	**E**
Expressway	126/146	<36,000	<54,000	<70,000	<86,000	<108,000
Prime Arterial	102/122	<22,200	<37,000	<44,600	<50,000	<57,000
Major Road	78/98	<14,800	<24,700	<29,600	<33,400	<37,000
Collector	64/84	<13,700	<22,800	<27,400	<30,800	<34,200
Town Collector	54/74	<3,000	<6,000	<9,500	<13,500	<19,000
Light Collector	40/60	<1,900	<4,100	<7,100	<10,900	<16,200
Rural Collector	40/84	<1,900	<4,100	<7,100	<10,900	<16,200
Rural Light Collector	40/60	<1,900	<4,100	<7,100	<10,900	<16,200
Recreational Parkway	40/100	<1,900	<4,100	<7,100	<10,900	<16,200
Rural Mountain	40/100	<1,900	<4,100	<7,100	<10,900	<16,200

NON – CIRCULATION ELEMENT ROADS		LEVEL OF SERVICE				
CLASS	**X-SECTION**	**A**	**B**	**C**	**D**	**E**
Residential Collector	40/60	*	*	<4,500	*	*
Residential Road	36/56	*	*	<1,500	*	*
Residential Cul-de-sac or Loop Road	32/52	*	*	< 200	*	*

*Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

LEVEL OF SERVICE (LOS) DEFINITIONS (generally used by Caltrans)

The concept of Level of Service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A Level of Service* definition generally describes these conditions in terms of such factors as speed, travel time, freedom to maneuver, comfort and convenience, and safety. Levels of Service definitions can generally be categorized as follows:

LOS	D/C*	Congestion/Delay	Traffic Description
		(Used for freeways, expressways and conventional highways^)	
"A"	<0.41	None	Free flow.
"B"	0.42-0.62	None	Free to stable flow, light to moderate volumes.
"C"	0.63-0.79	None to minimal	Stable flow, moderate volumes, freedom to maneuver noticeably restricted.
"D"	0.80-0.92	Minimal to substantial	Approaches unstable flow, heavy volumes, very limited freedom to maneuver.
"E"	0.93-1.00	Significant	Extremely unstable flow, maneuverability and psychological *comfort extremely poor.*
		(Used for conventional highways)	
"F"	>1.00	Considerable	Forced or breakdown. Delay measured in average flow, travel speed (MPH). Signalized segments experience delays >60.0 seconds/vehicle.
		(Used for freeways and expressways)	
"F0"	1.01-1.25	Considerable 0-1 hour delay	Forced flow, heavy congestion, long queues form behind breakdown points, stop and go.
"F1"	1.26-1.35	Severe 1-2 hour delay	Very heavy congestion, very long queues.
"F2"	1.36-1.45	Very severe 2-3 hour delay	Extremely heavy congestion, longer queues, more numerous breakdown points, longer stop periods.
"F3"	>1.46	Extremely severe *3+ hours of delay*	Gridlock.

* Level of Service can generally be calculated using "Table 3.1. LOS Criteria for Basic Freeway Sections" from the latest Highway Capacity Manual. However, contact Caltrans for more specific information on determining existing "free-flow" freeway speeds.

* Demand/Capacity ratio used for forecasts (V/C ratio used for operational analysis, where V = volume)

^ Arterial LOS is based upon average "free-flow" travel speeds, and should refer to definitions in Table 11.1 in the HCM.

[Attachment B]

DEFINITIONS OF KEY TERMS

Traffic Terms

Level of Service (LOS) corresponds to "excellent" through "failure" conditions in terms of traffic congestion, both for road segments and for intersections. It is used to provide an indication of the amount of delay a driver would experience along a road segment or the amount of wait time a driver would experience at an intersection. *LOS* is rated on a scale of A through F, with A representing excellent, free flow conditions, and F representing failures of road segments or intersections.

Volume to Capacity (V/C) Ratio is ratio of the actual traffic volume of a road segment or intersection to the design capacity of the road segment or intersection. It is used to provide an estimate of the level of service of the road segment or intersection.

AM or PM Peak Hours are those hours of the day in which the bulk of commute trips occur and in which traffic impacts are likely to be the greatest.

Average Daily Traffic (ADT) is the number of vehicles that use a roadway segment within a 24-hour period.

Capacity of a transportation facility is the maximum number of persons or vehicles that can be expected to traverse a point or uniform section of road within a specified time frame under prevailing roadway, traffic and control conditions. Theoretically, this is the point in which the flow rate (vehicles/hour) on the facility is the highest. The highest volume attainable under LOS E has been designated as the capacity of the arterial or collector.

Parking Terms

The following list highlights several key parking terms that are defined in the Zoning Ordinance:

Parking Area: An open area, other than a street or alley, which contains motor vehicle parking spaces.

Parking Space: An unobstructed space or area other than a street or alley, not less than the minimum size specified for the type of use provided with adequate ingress and egress, and which is permanently reserved and maintained for the parking of motor vehicles.

Covered Parking: Covered or enclosed parking spaces located anywhere on a building site where a structure may be located.

Loading Space: An area, other than a street or alley on the same lot with a building or a group of buildings not less than 10-feet wide, 35-feet long, and 14-feet high which affords adequate ingress and egress for trucks from a public street or alley, and which is permanently reserved and maintained for the temporary parking of commercial vehicles while loading or unloading merchandise or materials. Loading and unloading shall not obstruct access to any parking space.

Off-Street Parking: A facility/area for vehicle parking located outside of a public street right-of-way.

Open Parking: Open parking spaces are spaces located outside the ultimate right-of-way of any street.

APPENDIX D

INTERSECTION LEVEL OF SERVICE THRESHOLDS & CALCULATION SHEETS

LINSCOTT LAW & GREENSPAN

ENGINEERS

2000 & 1997 HIGHWAY CAPACITY MANUAL LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

In the 1997 Highway Capacity Manual (HCM), Level of Service for unsignalized intersections is determined by the computed or measured control delay and is defined for each minor movement. Level of Service is not defined for the intersection as a whole. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The criterias are given in the following table, and are based on the average control delay for any particular minor movement.

LEVEL OF SERVICE	AVERAGE CONTROL DELAY SEC/VEH	EXPECTED DELAY TO MINOR STREET TRAFFIC
A	0.0 ≤ 10.0	Little or no delay
B	10.1 to 15.0	Short traffic delays
C	15.1 to 25.0	Average traffic delays
D	25.1 to 35.0	Long traffic delays
E	35.1 to 50.0	Very long traffic delays
F	> 50.0	Severe congestion

Level of Service F exists when there are insufficient gaps of suitable size to allow a side street demand to safely cross through a major street traffic stream. This Level of Service is generally evident from extremely long control delays experienced by side-street traffic and by queuing on the minor-street approaches. The method, however, is based on a constant critical gap size; that is, the critical gap remains constant no matter how long the side-street motorist waits. LOS F may also appear in the form on side-street vehicles selecting smaller-than-usual gaps. In such cases, safety may be a problem, and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior, which are more difficult to observe in the field than queuing.

In most cases at Two-Way Stop Controlled (TWSC) intersections the critical movement is the minor-street left-turn movement. As such, the minor-street left-turn movement can generally be considered the primary factor affecting overall intersection performance. The lower threshold for LOS F is set at 50 seconds of delay per vehicle. There are many instances, particularly in urban areas, in which the delay equations will predict delays of 50 seconds (LOS F) or more for minor-street movements under very low volume conditions on the minor street (less than 25 vehicle/hour). Since the first term of the equation is a function only of the capacity, the LOS F threshold of 50 sec/vehicle is reached with a movement capacity of approximately 85 vehicle/hour or less.

This procedure assumes random arrivals on the major street. For a typical four-lane arterial with average daily traffic volumes in the range of 15,000 to 20,000 vehicles per day (peak hour, 1,500 to 2,000 vehicle/hour), the delay equation used in the TWSC capacity analysis procedure will predict 50 seconds of delay or more (LOS F) for many urban TWSC intersections that allow minor-street left-turn movements. **The LOS F threshold will be reached regardless of the volume of minor-street left-turning traffic.** Not-withstanding this fact, most low-volume minor-street approaches would not meet any of the volume or delay warrants for signalization of the *Manual on Uniform Traffic Control Devices* (MUTCD) since the warrants define an asymptote at 100 vehicle/hour on the minor approach. As a result, many public agencies that use the HCM Level of Service thresholds to determine the design adequacy of TWSC intersections may be forced to eliminate the minor-street left-turn movement, even when the movement may not present any operational problem, such as the formation of long queues on the minor street or driveway approach.

I. INTRODUCTION

SCOPE OF THE METHODOLOGY

Background and underlying concepts for this chapter are in Chapter 10

This chapter contains a methodology for analyzing the capacity and level of service (LOS) of signalized intersections. The analysis must consider a wide variety of prevailing conditions, including the amount and distribution of traffic movements, traffic composition, geometric characteristics, and details of intersection signalization. The methodology focuses on the determination of LOS for known or projected conditions.

The methodology addresses the capacity, LOS, and other performance measures for lane groups and intersection approaches and the LOS for the intersection as a whole. Capacity is evaluated in terms of the ratio of demand flow rate to capacity (v/c ratio), whereas LOS is evaluated on the basis of control delay per vehicle (in seconds per vehicle). Control delay is the portion of the total delay attributed to traffic signal operation for signalized intersections. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Appendix A presents a method for observing intersection control delay in the field. Exhibit 10-9 provides definitions of the basic terms used in this chapter.

A lane group is indicated in formulas by the subscript *i*

Each lane group is analyzed separately. Equations in this chapter use the subscript i to indicate each lane group. The capacity of the intersection as a whole is not addressed because both the design and the signalization of intersections focus on the accommodation of traffic movement on approaches to the intersection.

See Chapter 10 for description of quick estimation method

The capacity analysis methodology for signalized intersections is based on known or projected signalization plans. Two procedures are available to assist the analyst in establishing signalization plans. The first is the quick estimation method, which produces estimates of the cycle length and green times that can be considered to constitute a reasonable and effective signal timing plan. The quick estimation method requires minimal field data and relies instead on default values for the required traffic and control parameters. It is described and documented in Chapter 10.

A more detailed procedure is provided in Appendix B of this chapter for estimating the timing plan at both pretimed and traffic-actuated signals. The procedure for pretimed signals provides the basis for the design of signal timing plans that equalize the degree of saturation on the critical approaches for each phase of the signal sequence. This procedure does not, however, provide for optimal operation.

The methodology in this chapter is based in part on the results of a National Cooperative Highway Research Program (NCHRP) study (*1, 2*). Critical movement capacity analysis techniques have been developed in the United States (*3–5*), Australia (*6*), Great Britain (*7*), and Sweden (*8*). Background for delay estimation procedures was developed in Great Britain (*7*), Australia (*9, 10*), and the United States (*11*). Updates to the original methodology were developed subsequently (*12–24*).

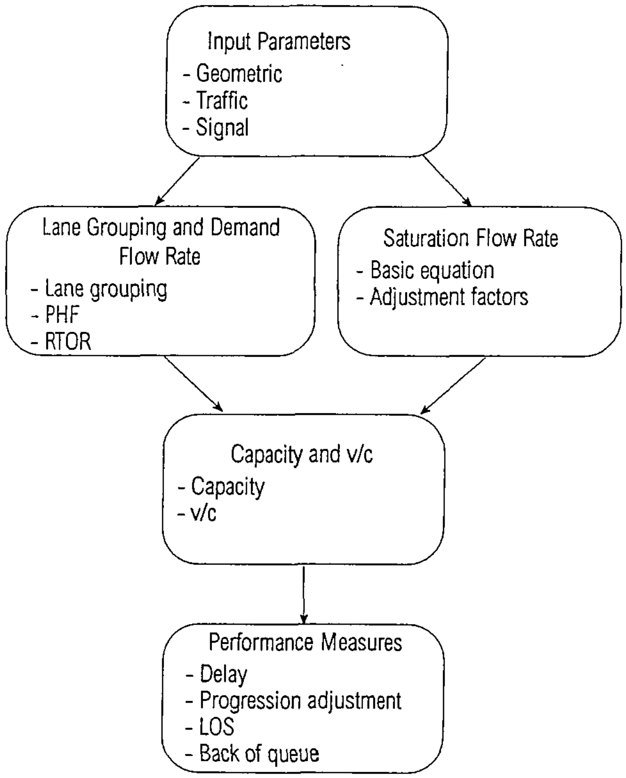
LIMITATIONS TO THE METHODOLOGY

The methodology does not take into account the potential impact of downstream congestion on intersection operation. Nor does the methodology detect and adjust for the impacts of turn-pocket overflows on through traffic and intersection operation.

II. METHODOLOGY

Exhibit 16-1 shows the input and the basic computation order for the method. The primary output of the method is level of service (LOS). This methodology covers a wide range of operational configurations, including combinations of phase plans, lane utilization, and left-turn treatment alternatives. It is important to note that some of these configurations may be considered unacceptable by some operating agencies from a traffic safety point of view. The safety aspect of signalized intersections cannot be ignored, and the provision in this chapter of a capacity and LOS analysis methodology for a specific operational configuration does not imply an endorsement of the suitability for application of such a configuration.

EXHIBIT 16-1. SIGNALIZED INTERSECTION METHODOLOGY



LOS

The average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersection as a whole. LOS is directly related to the control delay value. The criteria are listed in Exhibit 16-2.

LOS criteria

EXHIBIT 16-2. LOS CRITERIA FOR SIGNALIZED INTERSECTIONS

LOS	Control Delay per Vehicle (s/veh)
A	≤ 10
B	> 10–20
C	> 20–35
D	> 35–55
E	> 55–80
F	> 80

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

***

Intersection #1 SR 94/Jamacha Road

***

Cycle (sec):	100	Critical Vol./Cap. (X):	0.696
Loss Time (sec):	12 (Y+R = 4 sec)	Average Delay (sec/veh):	25.1
Optimal Cycle:	59	Level Of Service:	C

***

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Include			Ovl			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	2 0	1 0	1	1 0	1 0	1	1 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	878	20	164	3	4	29	58	1202	513	173	120	20
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	878	20	164	3	4	29	58	1202	513	173	120	20
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	954	22	178	3	4	32	63	1307	558	188	130	22
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	954	22	178	3	4	32	63	1307	558	188	130	22
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	954	22	178	3	4	32	63	1307	558	188	130	22
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	0.98	0.83	0.95	1.00	0.85	0.92	0.88	0.83	0.89	0.88	0.83
Lanes:	2.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3432	1862	1583	1805	1900	1615	1753	5037	1568	3400	5037	1568
Capacity Analysis Module:												
Vol/Sat:	0.28	0.01	0.11	0.00	0.00	0.02	0.04	0.26	0.36	0.06	0.03	0.01
Crit Moves:	****					****		****		****		
Green/Cycle:	0.40	0.41	0.49	0.01	0.03	0.03	0.26	0.37	0.77	0.08	0.19	0.19
Volume/Cap:	0.70	0.03	0.23	0.14	0.08	0.70	0.14	0.70	0.46	0.70	0.14	0.07
Uniform Del:	25.0	17.3	14.4	48.8	47.3	48.2	28.2	26.6	4.0	44.8	33.7	33.3
IncremntDel:	1.6	0.0	0.1	2.7	0.7	38.0	0.1	1.2	0.3	7.7	0.1	0.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	26.5	17.3	14.6	51.5	48.0	86.1	28.3	27.7	4.3	52.5	33.8	33.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	26.5	17.3	14.6	51.5	48.0	86.1	28.3	27.7	4.3	52.5	33.8	33.4
DesignQueue:	34	1	5	0	0	2	3	48	8	10	6	1

***

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #1 SR 94/Jamacha Road
********************************************************************************
Cycle (sec):          100                 Critical Vol./Cap. (X):        0.792
Loss Time (sec):       12 (Y+R =  4 sec) Average Delay (sec/veh):        26.6
Optimal Cycle:         75                 Level Of Service:                 C
********************************************************************************
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:       L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:             Ovl             Include           Ovl             Include
Min. Green:     0     0     0    0     0     0    0     0     0    0     0     0
Lanes:         2  0  1  0  1    1  0  1  0  1    1  0  3  0  1    2  0  3  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     779    30   136    38    26    75    90  1654   750   133  1316    41
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:  779    30   136    38    26    75    90  1654   750   133  1316    41
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92
PHF Volume:   847    33   148    41    28    82    98  1798   815   145  1430    45
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  847    33   148    41    28    82    98  1798   815   145  1430    45
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:   847    33   148    41    28    82    98  1798   815   145  1430    45
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  0.90  0.98  0.83  0.95  1.00  0.85  0.92  0.88  0.83  0.89  0.88  0.83
Lanes:       2.00  1.00  1.00  1.00  1.00  1.00  1.00  3.00  1.00  2.00  3.00  1.00
Final Sat.:  3432  1862  1583  1805  1900  1615  1753  5037  1568  3400  5037  1568
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.25  0.02  0.09  0.02  0.01  0.05  0.06  0.36  0.52  0.04  0.28  0.03
Crit Moves:  ****                          ****        ****        ****
Green/Cycle: 0.31  0.26  0.31  0.12  0.06  0.06  0.08  0.45  0.76  0.05  0.42  0.42
Volume/Cap:  0.79  0.07  0.30  0.20  0.23  0.79  0.67  0.79  0.68  0.79  0.67  0.07
Uniform Del: 31.5  27.9  26.1  39.9  44.5  46.2  44.5  23.4   5.9  46.8  23.4  17.2
IncremntDel:  4.1   0.1   0.3   0.5   1.0  32.9  11.8   2.0   1.6  20.5   0.9   0.0
Delay Adj:   1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Delay/Veh:   35.5  28.0  26.4  40.4  45.5  79.0  56.3  25.4   7.5  67.3  24.2  17.3
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:  35.5  28.0  26.4  40.4  45.5  79.0  56.3  25.4   7.5  67.3  24.2  17.3
DesignQueue:   34     1     6     2     1     4     5    60    12     8    49     1
********************************************************************************
```

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #2 SR 94-Campo Rd / Steele Canyon Rd

Cycle (sec):	100	Critical Vol./Cap. (X):	0.573
Loss Time (sec):	9 (Y+R = 4 sec)	Average Delay (sec/veh):	14.7
Optimal Cycle:	39	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1!	0 0	1 0	0	1 0	1 0	0	1 0	1 0	1	0 1
Volume Module:												
Base Vol:	0	0	0	63	0	149	60	253	0	0	673	142
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	63	0	149	60	253	0	0	673	142
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	0	0	0	68	0	162	65	275	0	0	732	154
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	68	0	162	65	275	0	0	732	154
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	68	0	162	65	275	0	0	732	154
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	1.00	1.00	0.95	1.00	0.85	0.95	1.00	1.00	1.00	1.00	0.85
Lanes:	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Final Sat.:	0	1900	0	1805	0	1615	1805	1900	0	1900	1900	1615
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.04	0.00	0.10	0.04	0.14	0.00	0.00	0.39	0.10
Crit Moves:						****	****				****	
Green/Cycle:	0.00	0.00	0.00	0.18	0.00	0.18	0.06	0.73	0.00	0.00	0.67	0.67
Volume/Cap:	0.00	0.00	0.00	0.22	0.00	0.57	0.57	0.20	0.00	0.00	0.57	0.14
Uniform Del:	0.0	0.0	0.0	35.4	0.0	37.8	45.5	4.1	0.0	0.0	8.8	6.0
IncremntDel:	0.0	0.0	0.0	0.3	0.0	2.8	6.9	0.1	0.0	0.0	0.6	0.1
Delay Adj:	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Delay/Veh:	0.0	0.0	0.0	35.7	0.0	40.7	52.4	4.2	0.0	0.0	9.4	6.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	35.7	0.0	40.7	52.4	4.2	0.0	0.0	9.4	6.0
DesignQueue:	0	0	0	3	0	8	3	4	0	0	15	3

```
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
                   Level Of Service Computation Report
          2000 HCM Operations Method (Base Volume Alternative)
*****************************************************************************
Intersection #2 SR 94-Campo Rd / Steele Canyon Rd
*****************************************************************************
Cycle (sec):          100              Critical Vol./Cap. (X):         0.546
Loss Time (sec):        9 (Y+R =  4 sec) Average Delay (sec/veh):        14.1
Optimal Cycle:         37              Level Of Service:                   B
*****************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Split Phase      Split Phase       Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Lanes:        0  0  0  1  0   1  0  0  1  0   1  0  0  1  0   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    1     4  139    0    68   89  716     0    0  397   113
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0    1     4  139    0    68   89  716     0    0  397   113
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92
PHF Volume:     0    1     4  151    0    74   97  778     0    0  432   123
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    0    1     4  151    0    74   97  778     0    0  432   123
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:     0    1     4  151    0    74   97  778     0    0  432   123
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  1.00 0.89  0.89 0.95 1.00  0.85 0.95 1.00  1.00 1.00 1.00  0.85
Lanes:       0.00 0.20  0.80 1.00 0.00  1.00 1.00 1.00  0.00 1.00 1.00  1.00
Final Sat.:     0  339  1356 1805    0  1615 1805 1900     0 1900 1900  1615
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00  0.00 0.08 0.00  0.05 0.05 0.41  0.00 0.00 0.23  0.08
Crit Moves:       ****       ****                  ****       ****
Green/Cycle: 0.00 0.01  0.01 0.15 0.00  0.15 0.14 0.75  0.00 0.00 0.61  0.61
Volume/Cap:  0.00 0.55  0.55 0.55 0.00  0.30 0.37 0.55  0.00 0.00 0.37  0.13
Uniform Del:  0.0 49.6  49.6 39.1  0.0  37.6 38.8  5.3   0.0  0.0 10.0   8.3
IncremntDel:  0.0 50.9  50.9  2.3  0.0   0.7  0.9  0.4   0.0  0.0  0.2   0.1
Delay Adj:   0.00 1.00  1.00 1.00 0.00  1.00 1.00 1.00  0.00 0.00 1.00  1.00
Delay/Veh:    0.0  100 100.5 41.4  0.0  38.2 39.7  5.7   0.0  0.0 10.2   8.4
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:   0.0  100 100.5 41.4  0.0  38.2 39.7  5.7   0.0  0.0 10.2   8.4
DesignQueue:    0    0     0    7    0     4    5   12     0    0   10     3
*****************************************************************************
```

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                  Level Of Service Computation Report
           2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #3 SR 94 / Lyons Valley Rd
********************************************************************************
Average Delay (sec/veh):    276.0          Worst Case Level Of Service:        F
********************************************************************************
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Uncontrolled      Uncontrolled
Rights:          Include          Include          Include           Include
Lanes:        0  1  0  0  1   0  1  0  0  1    1  0  0  1  0    1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      11    1    1     1    0   325   114  176    6      1  661    7
Growth Adj:  1.00 1.00 1.00  1.00 1.00  1.00  1.00 1.00 1.00   1.00 1.00 1.00
Initial Bse:   11    1    1     1    0   325   114  176    6      1  661    7
User Adj:    1.00 1.00 1.00  1.00 1.00  1.00  1.00 1.00 1.00   1.00 1.00 1.00
PHF Adj:     0.92 0.92 0.92  0.92 0.92  0.92  0.92 0.92 0.92   0.92 0.92 0.92
PHF Volume:    12    1    1     1    0   353   124  191    7      1  718    8
Reduct Vol:     0    0    0     0    0     0     0    0    0      0    0    0
Final Vol.:    12    1    1     1    0   353   124  191    7      1  718    8
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5  6.2   7.1 xxxx   6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0  3.3   3.5 xxxx   3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1343 1171  195  1168 xxxx   722   726 xxxx xxxxx   198 xxxx xxxxx
Potent Cap.:  130  194  852   172 xxxx   430   886 xxxx xxxxx  1387 xxxx xxxxx
Move Cap.:     21  167  852   152 xxxx   430   886 xxxx xxxxx  1387 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Stopped Del:xxxxx xxxx  9.2 xxxxx xxxx  41.8   9.7 xxxx xxxxx   7.6 xxxx xxxxx
LOS by Move:    *    *    A     *    *     E     A    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:   22 xxxx xxxxx   152 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shrd StpDel:298.2 xxxx xxxxx  28.8 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     F    *    *     D    *     *     *    *     *     *    *     *
ApproachDel:      276.0            41.8            xxxxxx            xxxxxx
ApproachLOS:        F                E                *                 *
```

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #3 SR 94 / Lyons Valley Rd
********************************************************************************
Average Delay (sec/veh):    156.4          Worst Case Level Of Service:        F
********************************************************************************
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Uncontrolled      Uncontrolled
Rights:           Include          Include          Include           Include
Lanes:        0  1  0  0  1   0  1  0  0  1    1  0  0  1  0    1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      17   10     5     7    5   231   221  559    19     8  412     8
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   17   10     5     7    5   231   221  559    19     8  412     8
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    18   11     5     8    5   251   240  608    21     9  448     9
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    18   11     5     8    5   251   240  608    21     9  448     9
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2   7.1  6.5   6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3   3.5  4.0   3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1696 1572   618  1576 1578   452   457 xxxx xxxxx   628 xxxx xxxxx
Potent Cap.:   74  111   493    90  110   612  1115 xxxx xxxxx   963 xxxx xxxxx
Move Cap.:     34   87   493    67   86   612  1115 xxxx xxxxx   963 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Stopped Del:xxxxx xxxx  12.4 xxxxx xxxx  14.9   9.1 xxxx xxxxx   8.8 xxxx xxxxx
LOS by Move:    *    *     B     *    *     B     A    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:   44 xxxx xxxxx    74 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shrd StpDel:183.1 xxxx xxxxx  64.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     F    *     *     F    *     *     *    *     *     *    *     *
ApproachDel:      156.4            17.4            xxxxxx            xxxxxx
ApproachLOS:        F                C                *                 *
```

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                     Level Of Service Computation Report
           2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #4 SR 94 / Jefferson Rd
********************************************************************************
Cycle (sec):         100              Critical Vol./Cap. (X):         0.635
Loss Time (sec):       9 (Y+R =  4 sec) Average Delay (sec/veh):       21.0
Optimal Cycle:        44              Level Of Service:                   C
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0    0     0    0    0     0    0    0     0    0    0
Lanes:       0  0  1! 0  0   0  1  0  0  1   1  0  1  0  1   1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     157   38    6    54   27   91    30  158   38     8  525   40
Growth Adj:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Initial Bse:  157   38    6    54   27   91    30  158   38     8  525   40
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.92 0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92
PHF Volume:   171   41    7    59   29   99    33  172   41     9  571   43
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Reduced Vol:  171   41    7    59   29   99    33  172   41     9  571   43
PCE Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Final Vol.:   171   41    7    59   29   99    33  172   41     9  571   43
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
Adjustment:  0.61 0.61 0.61  0.67 0.67 0.75  0.84 0.89 0.75  0.84 0.88 0.88
Lanes:       0.78 0.19 0.03  0.67 0.33 1.00  1.00 1.00 1.00  1.00 0.93 0.07
Final Sat.:   905  219   35   852  426 1429  1597 1682 1429  1597 1545  118
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.19 0.19 0.19  0.07 0.07 0.07  0.02 0.10 0.03  0.01 0.37 0.37
Crit Moves:       ****                       ****                   ****
Green/Cycle: 0.30 0.30 0.30  0.30 0.30 0.30  0.03 0.58 0.58  0.03 0.58 0.58
Volume/Cap:  0.64 0.64 0.64  0.23 0.23 0.23  0.64 0.18 0.05  0.18 0.64 0.64
Uniform Del: 30.5 30.5 30.5  26.6 26.6 26.6  47.8  9.7  9.0  47.2 13.9 13.9
IncremntDel:  3.9  3.9  3.9   0.3  0.3  0.3  23.4  0.1  0.0   1.7  1.4  1.4
Delay Adj:   1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Delay/Veh:   34.4 34.4 34.4  26.9 26.9 26.9  71.2  9.8  9.0  48.9 15.3 15.3
User DelAdj: 1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
AdjDel/Veh:  34.4 34.4 34.4  26.9 26.9 26.9  71.2  9.8  9.0  48.9 15.3 15.3
DesignQueue:    7    2    0     2    1    4     2    4    1     0   15    1
********************************************************************************
```

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #4 SR 94 / Jefferson Rd

Cycle (sec):	100	Critical Vol./Cap. (X):	0.302
Loss Time (sec):	9 (Y+R = 4 sec)	Average Delay (sec/veh):	15.1
Optimal Cycle:	26	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0 1! 0 0			0 1 0 0 1			1 0 1 0 1			1 0 0 1 0		
Volume Module:												
Base Vol:	29	54	26	52	33	29	30	158	38	6	266	51
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	29	54	26	52	33	29	30	158	38	6	266	51
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	32	59	28	57	36	32	33	172	41	7	289	55
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	32	59	28	57	36	32	33	172	41	7	289	55
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	32	59	28	57	36	32	33	172	41	7	289	55
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.88	0.88	0.88	0.80	0.80	0.85	0.95	1.00	0.85	0.95	0.98	0.98
Lanes:	0.27	0.49	0.24	0.61	0.39	1.00	1.00	1.00	1.00	1.00	0.84	0.16
Final Sat.:	446	831	400	924	586	1615	1805	1900	1615	1805	1556	298
Capacity Analysis Module:												
Vol/Sat:	0.07	0.07	0.07	0.06	0.06	0.02	0.02	0.09	0.03	0.00	0.19	0.19
Crit Moves:		****					****				****	
Green/Cycle:	0.23	0.23	0.23	0.23	0.23	0.23	0.06	0.65	0.65	0.03	0.62	0.62
Volume/Cap:	0.30	0.30	0.30	0.26	0.26	0.08	0.30	0.14	0.04	0.14	0.30	0.30
Uniform Del:	31.6	31.6	31.6	31.2	31.2	29.9	45.0	6.7	6.3	47.6	9.1	9.1
IncremntDel:	0.4	0.4	0.4	0.4	0.4	0.1	1.6	0.1	0.0	1.4	0.1	0.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	32.0	32.0	32.0	31.6	31.6	30.0	46.6	6.8	6.3	49.0	9.2	9.2
User DelAdj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
AdjDel/Veh:	28.8	28.8	28.8	28.5	28.5	27.0	41.9	6.1	5.7	44.1	8.3	8.3
DesignQueue:	1	3	1	2	2	1	2	3	1	0	6	1

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                       Level Of Service Computation Report
              2000 HCM Unsignalized Method (Base Volume Alternative)
*********************************************************************************
Intersection #5 SR 94 / Melody Rd / Procter Valley Rd
*********************************************************************************
Average Delay (sec/veh):      13.9          Worst Case Level Of Service:        B
*********************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:         0  1  0  0  0    0  0  0  1  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        2  516    0     0  168    4     19    0    5      0    0    0
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     2  516    0     0  168    4     19    0    5      0    0    0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:      2  561    0     0  183    4     21    0    5      0    0    0
Reduct Vol:      0    0    0     0    0    0      0    0    0      0    0    0
Final Vol.:      2  561    0     0  183    4     21    0    5      0    0    0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  187 xxxx xxxxx  xxxx xxxx xxxxx   750 xxxx   185  xxxx xxxx xxxxx
Potent Cap.: 1400 xxxx xxxxx  xxxx xxxx xxxxx   382 xxxx   863  xxxx xxxx xxxxx
Move Cap.:   1400 xxxx xxxxx  xxxx xxxx xxxxx   381 xxxx   863  xxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Stopped Del:  7.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  432 xxxxx  xxxx    0 xxxxx
Shrd StpDel:  7.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 13.9 xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    B     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx            13.9            xxxxxx
ApproachLOS:         *                *                B                *
```

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                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #5 SR 94 / Melody Rd / Procter Valley Rd
********************************************************************************
Average Delay (sec/veh):     14.2          Worst Case Level Of Service:       B
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  0    0  0  0  1  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       2  241     0     0  476    16     5    0     2     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    2  241     0     0  476    16     5    0     2     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:     2  262     0     0  517    17     5    0     2     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:     2  262     0     0  517    17     5    0     2     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4 xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5 xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  535 xxxx xxxxx  xxxx xxxx xxxxx   792 xxxx   526  xxxx xxxx xxxxx
Potent Cap.: 1043 xxxx xxxxx  xxxx xxxx xxxxx   361 xxxx   556  xxxx xxxx xxxxx
Move Cap.:   1043 xxxx xxxxx  xxxx xxxx xxxxx   360 xxxx   556  xxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Stopped Del:  8.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  400 xxxxx  xxxx    0 xxxxx
Shrd StpDel:  8.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 14.2 xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    B     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx             14.2           xxxxxx
ApproachLOS:         *                *                 B               *
```

Scenario Report

Scenario:	Ex+P am
Command:	ex + proj am
Volume:	Ex+P am
Geometry:	existing
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Scenario Report

Scenario:	Ex+P pm
Command:	ex + proj pm
Volume:	Ex+P pm
Geometry:	existing
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

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                    Level Of Service Computation Report
              2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #1 SR 94/Jamacha Road
********************************************************************************
Cycle (sec):         100               Critical Vol./Cap. (X):        0.717
Loss Time (sec):      12 (Y+R =  4 sec) Average Delay (sec/veh):       25.8
Optimal Cycle:        62               Level Of Service:                 C
********************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected         Protected        Protected
Rights:            Ovl             Include            Ovl             Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Lanes:       2  0  1  0  1   1  0  1  0  1   1  0  3  0  1   2  0  3  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    927   20   173     3    4    29    58 1202   539   182 1202    20
Growth Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse: 927   20   173     3    4    29    58 1202   539   182 1202    20
User Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:    0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume: 1008   22   188     3    4    32    63 1307   586   198 1307    22
Reduct Vol:    0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol: 1008  22   188     3    4    32    63 1307   586   198 1307    22
PCE Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.: 1008   22   188     3    4    32    63 1307   586   198 1307    22
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment: 0.90 0.98  0.83  0.95 1.00  0.85  0.92 0.88  0.83  0.89 0.88  0.83
Lanes:      2.00 1.00  1.00  1.00 1.00  1.00  1.00 3.00  1.00  2.00 3.00  1.00
Final Sat.: 3432 1862  1583  1805 1900  1615  1753 5037  1568  3400 5037  1568
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.29 0.01  0.12  0.00 0.00  0.02  0.04 0.26  0.37  0.06 0.26  0.01
Crit Moves: ****                        ****       ****        ****
Green/Cycle: 0.41 0.42  0.51  0.01 0.03  0.03  0.05 0.36  0.77  0.08 0.39  0.39
Volume/Cap: 0.72 0.03  0.24  0.14 0.08  0.72  0.67 0.72  0.48  0.72 0.67  0.04
Uniform Del: 24.7 16.8  13.9  48.8 47.4  48.3  46.4 27.5   4.2  44.8 25.2  18.9
IncremntDel:  1.8  0.0   0.2   2.9  0.7  43.5  16.7  1.4   0.3   8.7  0.9   0.0
InitQueuDel:  0.0  0.0   0.0   0.0  0.0   0.0   0.0  0.0   0.0   0.0  0.0   0.0
Delay Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Delay/Veh:  26.5 16.8  14.0  51.7 48.1  91.8  63.1 28.9   4.5  53.5 26.1  18.9
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh: 26.5 16.8  14.0  51.7 48.1  91.8  63.1 28.9   4.5  53.5 26.1  18.9
HCM2kAvg:     15    0     3     0    0     2     3   13     7     5   12     0
********************************************************************************
```

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #1 SR 94/Jamacha Road

Cycle (sec):	100	Critical Vol./Cap. (X):	0.806
Loss Time (sec):	12 (Y+R = 4 sec)	Average Delay (sec/veh):	27.3
Optimal Cycle:	78	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Include			Ovl			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	2 0 1 0 1			1 0 1 0 1			1 0 3 0 1			2 0 3 0 1		
Volume Module:												
Base Vol:	807	30	145	38	26	75	90	1654	784	144	1316	41
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	807	30	145	38	26	75	90	1654	784	144	1316	41
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	877	33	158	41	28	82	98	1798	852	157	1430	45
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	877	33	158	41	28	82	98	1798	852	157	1430	45
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	877	33	158	41	28	82	98	1798	852	157	1430	45
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	0.98	0.83	0.95	1.00	0.85	0.92	0.88	0.83	0.89	0.88	0.83
Lanes:	2.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3432	1862	1583	1805	1900	1615	1753	5037	1568	3400	5037	1568
Capacity Analysis Module:												
Vol/Sat:	0.26	0.02	0.10	0.02	0.01	0.05	0.06	0.36	0.54	0.05	0.28	0.03
Crit Moves:	****					****		****		****		
Green/Cycle:	0.32	0.27	0.32	0.11	0.06	0.06	0.08	0.44	0.76	0.06	0.42	0.42
Volume/Cap:	0.81	0.07	0.31	0.20	0.24	0.81	0.68	0.81	0.71	0.81	0.68	0.07
Uniform Del:	31.3	27.4	25.4	40.2	44.6	46.3	44.6	24.1	6.3	46.6	23.7	17.4
IncremntDel:	4.5	0.1	0.3	0.5	1.0	36.0	12.4	2.2	2.1	21.3	0.9	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	35.8	27.5	25.8	40.7	45.6	82.3	57.0	26.4	8.4	67.9	24.6	17.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	35.8	27.5	25.8	40.7	45.6	82.3	57.0	26.4	8.4	67.9	24.6	17.5
HCM2kAvg:	15	1	4	1	1	4	4	18	15	4	13	1

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #2 SR 94-Campo Rd / Steele Canyon Rd

Cycle (sec):	100	Critical Vol./Cap. (X):	0.618
Loss Time (sec):	9 (Y+R = 4 sec)	Average Delay (sec/veh):	14.9
Optimal Cycle:	42	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Split Phase			Split Phase			Protected			Protected	
Rights:		Include			Include			Include			Include	
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:		0 0 1! 0 0			1 0 0 1 0			1 0 0 1 0			1 0 1 0 1	
Volume Module:												
Base Vol:	0	0	0	67	0	149	60	288	0	0	710	147
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	67	0	149	60	288	0	0	710	147
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	0	0	0	73	0	162	65	313	0	0	772	160
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	0	0	73	0	162	65	313	0	0	772	160
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	0	0	0	73	0	162	65	313	0	0	772	160
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.97	0.97	0.97	0.92	0.97	0.82	0.92	0.97	0.97	0.97	0.97	0.82
Lanes:	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Final Sat.:	0	1834	0	1742	0	1558	1742	1834	0	1834	1834	1558
Capacity Analysis Module:												
Vol/Sat:	0.00	0.00	0.00	0.04	0.00	0.10	0.04	0.17	0.00	0.00	0.42	0.10
Crit Moves:						****	****				****	
Green/Cycle:	0.00	0.00	0.00	0.17	0.00	0.17	0.06	0.74	0.00	0.00	0.68	0.68
Volume/Cap:	0.00	0.00	0.00	0.25	0.00	0.62	0.62	0.23	0.00	0.00	0.62	0.15
Uniform Del:	0.0	0.0	0.0	36.1	0.0	38.6	45.8	4.0	0.0	0.0	8.8	5.7
IncremntDel:	0.0	0.0	0.0	0.4	0.0	4.4	10.6	0.1	0.0	0.0	0.9	0.1
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Delay/Veh:	0.0	0.0	0.0	36.6	0.0	43.0	56.5	4.1	0.0	0.0	9.7	5.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	0.0	0.0	36.6	0.0	43.0	56.5	4.1	0.0	0.0	9.7	5.7
HCM2kAvg:	0	0	0	2	0	6	3	3	0	0	13	2

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-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Base Volume Alternative)
*******************************************************************************
Intersection #2 SR 94-Campo Rd / Steele Canyon Rd
*******************************************************************************
Cycle (sec):        100              Critical Vol./Cap. (X):         0.598
Loss Time (sec):      9 (Y+R =  4 sec) Average Delay (sec/veh):       14.3
Optimal Cycle:       41              Level Of Service:                  B
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Split Phase      Split Phase       Protected         Protected
Rights:          Include          Include          Include           Include
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Lanes:        0  0  0  1  0   1  0  0  1  0   1  0  0  1  0   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    1     4  144    0    68   89  761     0    0  434   118
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0    1     4  144    0    68   89  761     0    0  434   118
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92
PHF Volume:     0    1     4  157    0    74   97  827     0    0  472   128
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    0    1     4  157    0    74   97  827     0    0  472   128
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:     0    1     4  157    0    74   97  827     0    0  472   128
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  0.97 0.86  0.86 0.92 0.97  0.82 0.92 0.97  0.97 0.97 0.97  0.82
Lanes:       0.00 0.20  0.80 1.00 0.00  1.00 1.00 1.00  0.00 1.00 1.00  1.00
Final Sat.:     0  327  1308 1742    0  1558 1742 1834     0 1834 1834  1558
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.00  0.00 0.09 0.00  0.05 0.06 0.45  0.00 0.00 0.26  0.08
Crit Moves:       ****       ****                   ****       ****
Green/Cycle: 0.00 0.01  0.01 0.15 0.00  0.15 0.13 0.75  0.00 0.00 0.62  0.62
Volume/Cap:  0.00 0.60  0.60 0.60 0.00  0.32 0.41 0.60  0.00 0.00 0.41  0.13
Uniform Del:  0.0 49.6  49.6 39.7  0.0  37.9 39.7  5.5   0.0  0.0  9.7   7.9
IncremntDel:  0.0 77.8  77.8  3.8  0.0   0.8  1.2  0.7   0.0  0.0  0.2   0.1
InitQueuDel:  0.0  0.0   0.0  0.0  0.0   0.0  0.0  0.0   0.0  0.0  0.0   0.0
Delay Adj:   0.00 1.00  1.00 1.00 0.00  1.00 1.00 1.00  0.00 0.00 1.00  1.00
Delay/Veh:    0.0  127 127.4 43.5  0.0  38.7 40.9  6.2   0.0  0.0 10.0   7.9
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:   0.0  127 127.4 43.5  0.0  38.7 40.9  6.2   0.0  0.0 10.0   7.9
HCM2kAvg:       0    1     1    6    0     2    3   12     0    0    7     2
*******************************************************************************
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-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                  Level Of Service Computation Report
          2000 HCM Unsignalized Method (Base Volume Alternative)
*******************************************************************************
Intersection #3 SR 94 / Lyons Valley Rd
*******************************************************************************
Average Delay (sec/veh):     17.8   Worst Case Level Of Service:      F[538.7]
*******************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  1   0  1  0  0  1   1  0  0  1  0   1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      11    1    1     1    0  325   114  215    6     1  703    7
Growth Adj:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Initial Bse:   11    1    1     1    0  325   114  215    6     1  703    7
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     0.92 0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92
PHF Volume:    12    1    1     1    0  353   124  234    7     1  764    8
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
Final Vol.:    12    1    1     1    0  353   124  234    7     1  764    8
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5  6.2   7.1 xxxx  6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0  3.3   3.5 xxxx  3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1432 1259  237  1256 xxxx  768   772 xxxx xxxxx   240 xxxx xxxxx
Potent Cap.:  113  172  807   150 xxxx  405   852 xxxx xxxxx  1338 xxxx xxxxx
Move Cap.:     13  147  807   132 xxxx  405   852 xxxx xxxxx  1338 xxxx xxxxx
Volume/Cap:  0.93 0.01 0.00  0.01 xxxx 0.87  0.15 xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Queue:       xxxxx xxxx  0.0 xxxxx xxxx  8.7   0.5 xxxx xxxxx   0.0 xxxx xxxxx
Stopped Del:xxxxx xxxx   9.5 xxxxx xxxx 50.9   9.9 xxxx xxxxx   7.7 xxxx xxxxx
LOS by Move:    *    *    A     *    *    F     A    *    *     A    *    *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.:   14 xxxx xxxxx  132 xxxx xxxxx xxxx xxxx xxxxx xxxx xxxx xxxxx
SharedQueue:  2.2 xxxx xxxxx  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd StpDel:582.8 xxxx xxxxx 32.5 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     F    *    *     D    *    *     *    *    *     *    *    *
ApproachDel:      538.7            50.8            xxxxxx           xxxxxx
ApproachLOS:        F                F                *                *
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                     Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #3 SR 94 / Lyons Valley Rd
********************************************************************************
Average Delay (sec/veh):       8.7   Worst Case Level Of Service:       F[220.8]
********************************************************************************
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled      Uncontrolled
Rights:           Include          Include          Include           Include
Lanes:        0  1  0  0  1   0  1  0  0  1   1  0  0  1  0   1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      17   10     5     7    5   231   221  609    19     8  454     8
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   17   10     5     7    5   231   221  609    19     8  454     8
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    18   11     5     8    5   251   240  662    21     9  493     9
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    18   11     5     8    5   251   240  662    21     9  493     9
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2   7.1  6.5   6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3   3.5  4.0   3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1796 1672   672  1676 1678   498   502 xxxx xxxxx   683 xxxx xxxxx
Potent Cap.:   63   97   459    76   96   576  1073 xxxx xxxxx   920 xxxx xxxxx
Move Cap.:     28   74   459    55   74   576  1073 xxxx xxxxx   920 xxxx xxxxx
Volume/Cap:  0.67 0.15  0.01  0.14 0.07  0.44  0.22 xxxx  xxxx  0.01 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Queue:       xxxxx xxxx  0.0 xxxxx xxxx   2.2   0.9 xxxx xxxxx   0.0 xxxx xxxxx
Stopped Del:xxxxx xxxx  12.9 xxxxx xxxx  16.0   9.3 xxxx xxxxx   9.0 xxxx xxxxx
LOS by Move:    *    *     B     *    *     C     A    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.:    36 xxxx xxxxx    62 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  2.9 xxxx xxxxx   0.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd StpDel:259.3 xxxx xxxxx  78.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     F    *     *     F    *     *     *    *     *     *    *     *
ApproachDel:      220.8             19.0            xxxxxx            xxxxxx
ApproachLOS:        F                 C                *                 *
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
                2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #4 SR 94 / Jefferson Rd
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap. (X):         0.738
Loss Time (sec):        9 (Y+R =  4 sec) Average Delay (sec/veh):        23.6
Optimal Cycle:         57              Level Of Service:                  C
********************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:          Permitted        Permitted        Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     0     0     0    0     0     0    0     0     0    0     0     0
Lanes:         0  0  1! 0  0   0  1  0  0  1   1  0  1  0  1   1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      157    38     6    56    27    91    30   197    38     8   567    42
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   157    38     6    56    27    91    30   197    38     8   567    42
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    171    41     7    61    29    99    33   214    41     9   616    46
Reduct Vol:      0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:   171    41     7    61    29    99    33   214    41     9   616    46
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    171    41     7    61    29    99    33   214    41     9   616    46
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:   0.55 0.55  0.55  0.61 0.61  0.68  0.76 0.80  0.68  0.76 0.79  0.79
Lanes:        0.78 0.19  0.03  0.67 0.33  1.00  1.00 1.00  1.00  1.00 0.93  0.07
Final Sat.:    813  197    31   780  376  1295  1448 1524  1295  1448 1405   104
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      0.21 0.21  0.21  0.08 0.08  0.08  0.02 0.14  0.03  0.01 0.44  0.44
Crit Moves:        ****                         ****                   ****
Green/Cycle:  0.28 0.28  0.28  0.28 0.28  0.28  0.03 0.60  0.60  0.03 0.59  0.59
Volume/Cap:   0.74 0.74  0.74  0.27 0.27  0.27  0.74 0.23  0.05  0.23 0.74  0.74
Uniform Del:  32.4 32.4  32.4  27.8 27.8  27.7  48.1  9.3   8.3  47.8 14.6  14.6
IncremntDel:   9.4  9.4   9.4   0.5  0.5   0.4  48.2  0.1   0.0   3.2  3.3   3.3
InitQueuDel:   0.0  0.0   0.0   0.0  0.0   0.0   0.0  0.0   0.0   0.0  0.0   0.0
Delay Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Delay/Veh:    41.8 41.8  41.8  28.2 28.2  28.1  96.2  9.4   8.3  51.0 17.9  17.9
User DelAdj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   41.8 41.8  41.8  28.2 28.2  28.1  96.2  9.4   8.3  51.0 17.9  17.9
HCM2kAvg:       10   10    10     3    3     2     2    3     1     1   16    16
********************************************************************************
```

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #4 SR 94 / Jefferson Rd

Cycle (sec):	100	Critical Vol./Cap. (X):	0.623
Loss Time (sec):	9 (Y+R = 4 sec)	Average Delay (sec/veh):	15.5
Optimal Cycle:	43	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1! 0	0	0 1	0 0	1	1 0	1 0	1	1 0	0 1	0
Volume Module:												
Base Vol:	29	54	26	55	33	29	29	523	132	6	308	53
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	29	54	26	55	33	29	29	523	132	6	308	53
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	32	59	28	60	36	32	32	568	143	7	335	58
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	32	59	28	60	36	32	32	568	143	7	335	58
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	32	59	28	60	36	32	32	568	143	7	335	58
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.58	0.58	0.58	0.47	0.47	0.56	0.63	0.66	0.56	0.63	0.65	0.65
Lanes:	0.27	0.49	0.24	0.62	0.38	1.00	1.00	1.00	1.00	1.00	0.85	0.15
Final Sat.:	292	544	262	558	335	1066	1191	1254	1066	1191	1046	180
Capacity Analysis Module:												
Vol/Sat:	0.11	0.11	0.11	0.11	0.11	0.03	0.03	0.45	0.13	0.01	0.32	0.32
Crit Moves:		****						****		****		
Green/Cycle:	0.17	0.17	0.17	0.17	0.17	0.17	0.06	0.73	0.73	0.01	0.68	0.68
Volume/Cap:	0.62	0.62	0.62	0.62	0.62	0.17	0.47	0.62	0.18	0.62	0.47	0.47
Uniform Del:	38.3	38.3	38.3	38.3	38.3	35.2	45.7	6.8	4.3	49.4	7.5	7.5
IncremntDel:	6.3	6.3	6.3	7.4	7.4	0.4	5.1	1.3	0.1	80.3	0.4	0.4
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	44.6	44.6	44.6	45.6	45.6	35.6	50.9	8.1	4.4	129.7	7.9	7.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.6	44.6	44.6	45.6	45.6	35.6	50.9	8.1	4.4	129.7	7.9	7.9
HCM2kAvg:	5	5	5	5	5	1	2	9	1	1	6	6

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                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #5 SR 94 / Melody Rd / Procter Valley Rd
********************************************************************************
Average Delay (sec/veh):       1.8   Worst Case Level Of Service:       C[ 18.9]
********************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       2  516     2     41  168     4     19    0     5      2    0    44
Growth Adj:  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
Initial Bse:    2  516     2     41  168     4     19    0     5      2    0    44
User Adj:    1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92   0.92 0.92  0.92   0.92 0.92  0.92   0.92 0.92  0.92
PHF Volume:     2  561     2     45  183     4     21    0     5      2    0    48
Reduct Vol:     0    0     0      0    0     0      0    0     0      0    0     0
Final Vol.:     2  561     2     45  183     4     21    0     5      2    0    48
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx    4.1 xxxx xxxxx    7.1 xxxx   6.2    7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx    2.2 xxxx xxxxx    3.5 xxxx   3.3    3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  187 xxxx xxxxx    563 xxxx xxxxx    864 xxxx   185    843 xxxx   562
Potent Cap.: 1400 xxxx xxxxx   1019 xxxx xxxxx    277 xxxx   863    286 xxxx   530
Move Cap.:   1400 xxxx xxxxx   1019 xxxx xxxxx    243 xxxx   863    274 xxxx   530
Volume/Cap:  0.00 xxxx  xxxx   0.04 xxxx  xxxx   0.09 xxxx  0.01   0.01 xxxx  0.09
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Queue:        0.0 xxxx xxxxx    0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Stopped Del:  7.6 xxxx xxxxx    8.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *      A    *     *      *    *     *      *    *     *
Movement:      LT - LTR - RT     LT - LTR - RT     LT - LTR - RT     LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx xxxx xxxxx   xxxx  285 xxxxx   xxxx  510 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.3 xxxxx xxxxx  0.3 xxxxx
Shrd StpDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 18.9 xxxxx xxxxx 12.8 xxxxx
Shared LOS:     *    *     *      *    *     *      *    C     *      *    B     *
ApproachDel:      xxxxxx           xxxxxx             18.9              12.8
ApproachLOS:        *                *                  C                 B
```

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-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Base Volume Alternative)
*******************************************************************************
Intersection #5 SR 94 / Melody Rd / Procter Valley Rd
*******************************************************************************
Average Delay (sec/veh):      1.2   Worst Case Level Of Service:      C[ 18.7]
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        2  241     3     53  476    16      5    0     2      2    0    44
Growth Adj:   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
Initial Bse:     2  241     3     53  476    16      5    0     2      2    0    44
User Adj:     1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:      0.92 0.92  0.92   0.92 0.92  0.92   0.92 0.92  0.92   0.92 0.92  0.92
PHF Volume:      2  262     3     58  517    17      5    0     2      2    0    48
Reduct Vol:      0    0     0      0    0     0      0    0     0      0    0     0
Final Vol.:      2  262     3     58  517    17      5    0     2      2    0    48
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx    4.1 xxxx xxxxx    7.1 xxxx   6.2    7.1 xxxx   6.2
FollowUpTim:   2.2 xxxx xxxxx    2.2 xxxx xxxxx    3.5 xxxx   3.3    3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   535 xxxx xxxxx    265 xxxx xxxxx    933 xxxx   526    910 xxxx   264
Potent Cap.:  1043 xxxx xxxxx   1310 xxxx xxxxx    248 xxxx   556    257 xxxx   780
Move Cap.:    1043 xxxx xxxxx   1310 xxxx xxxxx    225 xxxx   556    247 xxxx   780
Volume/Cap:   0.00 xxxx  xxxx   0.04 xxxx  xxxx   0.02 xxxx  0.00   0.01 xxxx  0.06
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Queue:         0.0 xxxx xxxxx    0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Stopped Del:   8.5 xxxx xxxxx    7.9 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     A    *     *      A    *     *      *    *     *      *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx xxxx xxxxx   xxxx  271 xxxxx   xxxx  713 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx xxxxx  0.2 xxxxx
Shrd StpDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 18.7 xxxxx xxxxx 10.4 xxxxx
Shared LOS:      *    *     *      *    *     *      *    C     *      *    B     *
ApproachDel:       xxxxxx            xxxxxx              18.7             10.4
ApproachLOS:          *                 *                  C                B
```

Scenario Report

Scenario:	Ex+P+CP am
Command:	ex + proj + cuml am
Volume:	Ex+P+CP am
Geometry:	existing
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Scenario Report

Scenario:	Ex+P+CP pm
Command:	ex am
Volume:	Ex+P+CP pm
Geometry:	existing
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #1 SR 94/Jamacha Road

Cycle (sec):	100	Critical Vol./Cap.(X):	0.811
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	27.3
Optimal Cycle:	80	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Ovl			Include			Ovl			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	2 0 1 0 1			1 0 1 0 1			1 0 3 0 1			2 0 3 0 1		
Volume Module:												
Base Vol:	1161	20	210	3	4	29	58	1202	824	210	1202	20
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	1161	20	210	3	4	29	58	1202	824	210	1202	20
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	1262	22	228	3	4	32	63	1307	896	228	1307	22
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1262	22	228	3	4	32	63	1307	896	228	1307	22
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1262	22	228	3	4	32	63	1307	896	228	1307	22
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	0.98	0.83	0.95	1.00	0.85	0.92	0.88	0.83	0.89	0.88	0.83
Lanes:	2.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3432	1862	1583	1805	1900	1615	1753	5037	1568	3400	5037	1568
Capacity Analysis Module:												
Vol/Sat:	0.37	0.01	0.14	0.00	0.00	0.02	0.04	0.26	0.57	0.07	0.26	0.01
Crit Moves:	****					****		****		****		
Green/Cycle:	0.45	0.47	0.55	0.01	0.02	0.02	0.05	0.32	0.77	0.08	0.35	0.35
Volume/Cap:	0.81	0.03	0.26	0.17	0.10	0.81	0.73	0.81	0.74	0.81	0.73	0.04
Uniform Del:	23.6	14.4	11.9	49.0	47.7	48.6	46.9	31.2	6.0	45.1	28.2	21.2
IncremntDel:	3.3	0.0	0.2	3.9	0.9	74.1	27.6	3.2	2.4	16.1	1.6	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	27.0	14.4	12.0	52.9	48.6	122.7	74.5	34.5	8.4	61.2	29.8	21.2
User DelAdj:	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
AdjDel/Veh:	26.0	13.9	11.6	51.1	47.0	118.5	71.9	33.3	8.2	59.1	28.8	20.5
LOS by Move:	C	B	B	D	D	F	E	C	A	E	C	C
HCM2kAvgQ:	19	0	4	0	0	2	3	16	16	6	14	0

Note: Queue reported is the number of cars per lane.

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #1 SR 94/Jamacha Road

Cycle (sec):	100	Critical Vol./Cap.(X):	1.148
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	52.8
Optimal Cycle:	180	Level Of Service:	D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:		Protected			Protected			Protected			Protected	
Rights:		Ovl			Include			Ovl			Include	
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:		2 0 1 0 1			1 0 1 0 1			1 0 3 0 1			2 0 3 0 1	
Volume Module:												
Base Vol:	1224	20	192	38	26	75	90	1654	1299	186	1316	41
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	1224	20	192	38	26	75	90	1654	1299	186	1316	41
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	1330	22	209	41	28	82	98	1798	1412	202	1430	45
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	1330	22	209	41	28	82	98	1798	1412	202	1430	45
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	1330	22	209	41	28	82	98	1798	1412	202	1430	45
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.90	0.98	0.83	0.95	1.00	0.85	0.92	0.88	0.83	0.89	0.88	0.83
Lanes:	2.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3432	1862	1583	1805	1900	1615	1753	5037	1568	3400	5037	1568
Capacity Analysis Module:												
Vol/Sat:	0.39	0.01	0.13	0.02	0.01	0.05	0.06	0.36	0.90	0.06	0.28	0.03
Crit Moves:	****					****			****	****		
Green/Cycle:	0.34	0.29	0.34	0.09	0.04	0.04	0.08	0.45	0.78	0.05	0.42	0.42
Volume/Cap:	1.15	0.04	0.39	0.25	0.34	1.15	0.68	0.80	1.15	1.15	0.68	0.07
Uniform Del:	33.1	25.5	25.0	42.2	46.4	47.8	44.6	23.8	10.8	47.4	23.8	17.5
IncremntDel:	77.1	0.0	0.5	0.8	2.4	152.5	12.6	2.1	76.5	113.3	0.9	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	110.2	25.5	25.4	43.0	48.8	200.3	57.3	25.9	87.3	160.7	24.7	17.6
User DelAdj:	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
AdjDel/Veh:	93.6	21.7	21.6	36.6	41.5	170.3	48.7	22.0	74.2	136.6	21.0	14.9
LOS by Move:	F	C	C	D	D	F	D	C	E	F	C	B
HCM2kAvgQ:	35	0	5	1	1	6	4	19	68	7	14	1

Note: Queue reported is the number of cars per lane.

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                    Level Of Service Computation Report
          2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #2 SR 94-Campo Rd / Steele Canyon Rd
********************************************************************************
Cycle (sec):        100              Critical Vol./Cap.(X):        0.830
Loss Time (sec):      9 (Y+R=4.0 sec) Average Delay (sec/veh):      18.0
Optimal Cycle:       76              Level Of Service:                 B
********************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Split Phase      Split Phase       Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:     0     0     0    0     0     0    0     0     0    0     0     0
Lanes:        0  0  1! 0  0   1  0  0  1  0   1  0  0  1  0   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0     0     0   88     0   154   63   597     0    0   981   166
Growth Adj:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse:    0     0     0   88     0   154   63   597     0    0   981   166
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92
PHF Volume:     0     0     0   96     0   167   68   649     0    0  1066   180
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:    0     0     0   96     0   167   68   649     0    0  1066   180
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Final Vol.:     0     0     0   96     0   167   68   649     0    0  1066   180
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900  1900
Adjustment:  0.93  0.93  0.93 0.88  0.93  0.79 0.88  0.93  0.93 0.93  0.93  0.79
Lanes:       0.00  1.00  0.00 1.00  0.00  1.00 1.00  1.00  0.00 1.00  1.00  1.00
Final Sat.:     0  1767     0 1679     0  1502 1679  1767     0 1767  1767  1502
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00 0.06  0.00  0.11 0.04  0.37  0.00 0.00  0.60  0.12
Crit Moves:                               **** ****                   ****
Green/Cycle: 0.00  0.00  0.00 0.13  0.00  0.13 0.05  0.78  0.00 0.00  0.73  0.73
Volume/Cap:  0.00  0.00  0.00 0.42  0.00  0.83 0.83  0.47  0.00 0.00  0.83  0.17
Uniform Del:  0.0   0.0   0.0 39.7   0.0  42.2 47.1   4.0   0.0  0.0   9.4   4.2
IncremntDel:  0.0   0.0   0.0  1.3   0.0  24.2 47.9   0.3   0.0  0.0   4.7   0.1
InitQueuDel:  0.0   0.0   0.0  0.0   0.0   0.0  0.0   0.0   0.0  0.0   0.0   0.0
Delay Adj:   0.00  0.00  0.00 1.00  0.00  1.00 1.00  1.00  0.00 0.00  1.00  1.00
Delay/Veh:    0.0   0.0   0.0 41.0   0.0  66.4 95.0   4.2   0.0  0.0  14.1   4.3
User DelAdj: 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
AdjDel/Veh:   0.0   0.0   0.0 41.0   0.0  66.4 95.0   4.2   0.0  0.0  14.1   4.3
LOS by Move:    A     A     A    D     A     E    F     A     A    A     B     A
HCM2kAvgQ:      0     0     0    3     0     7    4     7     0    0    25     2
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                     Level Of Service Computation Report
            2000 HCM Operations Method (Base Volume Alternative)
*******************************************************************************
Intersection #2 SR 94-Campo Rd / Steele Canyon Rd
*******************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):        1.069
Loss Time (sec):        9 (Y+R=4.0 sec) Average Delay (sec/veh):       45.1
Optimal Cycle:        180               Level Of Service:                D
*******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Split Phase      Split Phase       Protected        Protected
Rights:            Include          Include          Include          Include
Min. Green:     0     0     0   0     0     0   0     0     0   0     0     0
Lanes:        0  0  0  1  0   1  0  0  1  0   1  0  0  1  0   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0     1     4   185     0    71    97  1330     0     0   885   151
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:    0     1     4   185     0    71    97  1330     0     0   885   151
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92  0.92
PHF Volume:     0     1     4   201     0    77   105  1446     0     0   962   164
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:    0     1     4   201     0    77   105  1446     0     0   962   164
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Final Vol.:     0     1     4   201     0    77   105  1446     0     0   962   164
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900  1900
Adjustment:  0.90  0.80  0.80  0.86  0.90  0.77  0.86  0.90  0.90  0.90  0.90  0.77
Lanes:       0.00  0.20  0.80  1.00  0.00  1.00  1.00  1.00  0.00  1.00  1.00  1.00
Final Sat.:     0   305  1220  1625     0  1454  1625  1710     0  1710  1710  1454
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00  0.00  0.00  0.12  0.00  0.05  0.06  0.85  0.00  0.00  0.56  0.11
Crit Moves:        ****        ****                    ****        ****
Green/Cycle: 0.00  0.00  0.00  0.12  0.00  0.12  0.08  0.79  0.00  0.00  0.71  0.71
Volume/Cap:  0.00  1.07  1.07  1.07  0.00  0.46  0.79  1.07  0.00  0.00  0.79  0.16
Uniform Del:  0.0  49.8  49.8  44.2   0.0  41.3  45.1  10.5   0.0   0.0   9.7   4.8
IncremntDel:  0.0   428 428.5  85.1   0.0   2.0  27.0  45.2   0.0   0.0   3.7   0.1
InitQueuDel:  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
Delay Adj:   0.00  1.00  1.00  1.00  0.00  1.00  1.00  1.00  0.00  0.00  1.00  1.00
Delay/Veh:    0.0   478 478.3 129.3   0.0  43.3  72.1  55.7   0.0   0.0  13.4   4.8
User DelAdj: 1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
AdjDel/Veh:   0.0   478 478.3 129.3   0.0  43.3  72.1  55.7   0.0   0.0  13.4   4.8
LOS by Move:    A     F     F     F     A     D     E     E     A     A     B     A
HCM2kAvgQ:      0     1     1    11     0     3     5    61     0     0    21     2
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
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---------------------------------------------------------------------------------
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                    Level Of Service Computation Report
          2000 HCM Unsignalized Method (Base Volume Alternative)
*********************************************************************************
Intersection #3 SR 94 / Lyons Valley Rd
*********************************************************************************
Average Delay (sec/veh): OVERFLOW      Worst Case Level Of Service: F[xxxxx]
*********************************************************************************
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled      Uncontrolled
Rights:          Include          Include           Include           Include
Lanes:        0  1  0  0  1    0  1  0  0  1    1  0  0  1  0    1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      11    1     1     3    0   352   127  521     6     1  959     8
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   11    1     1     3    0   352   127  521     6     1  959     8
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    12    1     1     3    0   383   138  566     7     1 1042     9
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    12    1     1     3    0   383   138  566     7     1 1042     9
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2   7.1 xxxx   6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3   3.5 xxxx   3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 2086 1899   570  1896 xxxx  1047  1051 xxxx xxxxx   573 xxxx xxxxx
Potent Cap.:   39   70   525    54 xxxx   280   670 xxxx xxxxx  1010 xxxx xxxxx
Move Cap.:      0   56   525    44 xxxx   280   670 xxxx xxxxx  1010 xxxx xxxxx
Volume/Cap:  xxxx 0.02  0.00  0.07 xxxx  1.37  0.21 xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx   0.0  xxxx xxxx  20.0   0.8 xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx  11.9 xxxxx xxxx 222.2  11.8 xxxx xxxxx   8.6 xxxx xxxxx
LOS by Move:    *    *     B     *    *     F     B    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:    0 xxxx xxxxx    44 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx   0.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx  92.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     F    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx            221.1            xxxxxx            xxxxxx
ApproachLOS:        F                F                 *                 *
*********************************************************************************
Note: Queue reported is the number of cars per lane.
*********************************************************************************
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                     Level Of Service Computation Report
           2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #3 SR 94 / Lyons Valley Rd
********************************************************************************
Average Delay (sec/veh): OVERFLOW       Worst Case Level Of Service: F[xxxxx]
********************************************************************************
Approach:     North Bound      South Bound       East Bound        West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign       Uncontrolled      Uncontrolled
Rights:          Include          Include          Include           Include
Lanes:       0  1  0  0  1    0  1  0  0  1    1  0  0  1  0    1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      17   10    5     9    5   255    263 1169    19     8  914     9
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   17   10    5     9    5   255    263 1169    19     8  914     9
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    18   11    5    10    5   277    286 1271    21     9  993    10
Reduct Vol:     0    0    0     0    0     0      0    0     0     0    0     0
Final Vol.:    18   11    5    10    5   277    286 1271    21     9  993    10
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  7.1  6.5   6.2   7.1  6.5   6.2   4.1 xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3   3.5  4.0   3.3   2.2 xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 3010 2873  1281  2877 2879   998  1003 xxxx xxxxx  1291 xxxx xxxxx
Potent Cap.:    8   17   204    11   17   298   698 xxxx xxxxx   544 xxxx xxxxx
Move Cap.:      0   10   204     0   10   298   698 xxxx xxxxx   544 xxxx xxxxx
Volume/Cap: 79.61 1.12  0.03  xxxx 0.56  0.93  0.41 xxxx  xxxx  0.02 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx   0.1  xxxx xxxx   9.0   2.0 xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx  23.1 xxxxx xxxx  73.9  13.7 xxxx xxxxx  11.7 xxxx xxxxx
LOS by Move:    *    *     C     *    *     F     B    *     *     B    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:    0 xxxx xxxxx     0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  5.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:53951 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     F    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx            xxxxxx            xxxxxx
ApproachLOS:         F                F                 *                 *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #4 SR 94 / Jefferson Rd

Cycle (sec):	100	Critical Vol./Cap.(X):	1.016
Loss Time (sec):	9 (Y+R=4.0 sec)	Average Delay (sec/veh):	52.7
Optimal Cycle:	180	Level Of Service:	D

Approach:	North Bound	South Bound	East Bound	West Bound
Movement:	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Permitted	Permitted	Protected	Protected
Rights:	Include	Include	Include	Include
Lanes:	0 0 1! 0 0	0 1 0 0 1	1 0 1 0 1	1 0 0 1 0

Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Volume Module:												
Base Vol:	181	39	6	64	28	195	130	389	63	8	694	45
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	181	39	6	64	28	195	130	389	63	8	694	45
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	197	42	7	70	30	212	141	423	68	9	754	49
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	197	42	7	70	30	212	141	423	68	9	754	49
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	197	42	7	70	30	212	141	423	68	9	754	49
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.50	0.50	0.50	0.58	0.58	0.65	0.72	0.76	0.65	0.72	0.75	0.75
Lanes:	0.80	0.17	0.03	0.70	0.30	1.00	1.00	1.00	1.00	1.00	0.94	0.06
Final Sat.:	757	163	25	767	336	1227	1372	1444	1227	1372	1344	87
Capacity Analysis Module:												
Vol/Sat:	0.26	0.26	0.26	0.09	0.09	0.17	0.10	0.29	0.06	0.01	0.56	0.56
Crit Moves:		****					****				****	
Green/Cycle:	0.26	0.26	0.26	0.26	0.26	0.26	0.10	0.64	0.64	0.01	0.55	0.55
Volume/Cap:	1.02	1.02	1.02	0.35	0.35	0.67	1.02	0.46	0.09	0.46	1.02	1.02
Uniform Del:	37.2	37.2	37.2	30.4	30.4	33.5	44.9	9.2	6.9	48.9	22.4	22.4
IncremntDel:	62.0	62.0	62.0	0.8	0.8	5.7	80.5	0.4	0.0	16.4	36.0	36.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	99.2	99.2	99.2	31.2	31.2	39.2	125.5	9.5	6.9	65.4	58.4	58.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	99.2	99.2	99.2	31.2	31.2	39.2	125.5	9.5	6.9	65.4	58.4	58.4
LOS by Move:	F	F	F	C	C	D	F	A	A	E	E	E
HCM2kAvgQ:	13	13	13	3	3	7	8	7	1	1	33	33

Note: Queue reported is the number of cars per lane.

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--------------------------------------------------------------------------------
                     Level Of Service Computation Report
           2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #4 SR 94 / Jefferson Rd
********************************************************************************
Cycle (sec):          100                Critical Vol./Cap.(X):         0.983
Loss Time (sec):        9 (Y+R=4.0 sec)  Average Delay (sec/veh):        46.8
Optimal Cycle:        176                Level Of Service:                  D
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Permitted        Permitted        Protected         Protected
Rights:           Include          Include          Include           Include
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Lanes:        0  0  1! 0  0   0  1  0  0  1    1  0  1  0  1    1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      52   54    26    58   34   249   288  797   161     6  524    61
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   52   54    26    58   34   249   287  795   161     6  523    61
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    56   59    28    63   37   270   312  865   175     7  568    66
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   56   59    28    63   37   270   312  865   175     7  568    66
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    56   59    28    63   37   270   312  865   175     7  568    66
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  0.63 0.63  0.63  0.56 0.56  0.65  0.72 0.76  0.65  0.72 0.75  0.75
Lanes:       0.39 0.41  0.20  0.63 0.37  1.00  1.00 1.00  1.00  1.00 0.90  0.10
Final Sat.:   473  491   236   675  395  1227  1372 1444  1227  1372 1273   148
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.12 0.12  0.12  0.09 0.09  0.22  0.23 0.60  0.14  0.00 0.45  0.45
Crit Moves:                               ****  ****                   ****
Green/Cycle: 0.22 0.22  0.22  0.22 0.22  0.22  0.23 0.68  0.68  0.01 0.45  0.45
Volume/Cap:  0.53 0.53  0.53  0.42 0.42  0.98  0.98 0.88  0.21  0.88 0.98  0.98
Uniform Del: 34.2 34.2  34.2  33.2 33.2  38.6  38.2 12.7   5.9  49.7 26.9  26.9
IncremntDel:  2.1  2.1   2.1   1.2  1.2  49.4  45.7  9.2   0.1 253.0 31.0  31.0
InitQueuDel:  0.0  0.0   0.0   0.0  0.0   0.0   0.0  0.0   0.0   0.0  0.0   0.0
Delay Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Delay/Veh:   36.3 36.3  36.3  34.4 34.4  88.0  83.9 21.9   6.1 302.7 57.9  57.9
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  36.3 36.3  36.3  34.4 34.4  88.0  83.9 21.9   6.1 302.7 57.9  57.9
LOS by Move:    D    D     D     C    C     F     F    C     A     F    E     E
HCM2kAvgQ:      5    5     5     3    3    13    15   24     2     1   26    26
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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                      Level Of Service Computation Report
            2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #5 SR 94 / Melody Rd / Procter Valley Rd
********************************************************************************
Average Delay (sec/veh):      5.6   Worst Case Level Of Service:      E[ 43.0]
********************************************************************************
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled       Stop Sign         Stop Sign
Rights:          Include          Include          Include           Include
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      10  521     2    41  180   176   103    0    14     2    0    44
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   10  521     2    41  180   176   103    0    14     2    0    44
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    11  566     2    45  196   191   112    0    15     2    0    48
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    11  566     2    45  196   191   112    0    15     2    0    48
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  387 xxxx xxxxx   568 xxxx xxxxx   993 xxxx   291   977 xxxx   567
Potent Cap.: 1183 xxxx xxxxx  1014 xxxx xxxxx   226 xxxx   753   232 xxxx   527
Move Cap.:   1183 xxxx xxxxx  1014 xxxx xxxxx   197 xxxx   753   218 xxxx   527
Volume/Cap:  0.01 xxxx  xxxx  0.04 xxxx  xxxx  0.57 xxxx  0.02  0.01 xxxx  0.09
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Queue:        0.0 xxxx xxxxx   0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Stopped Del:  8.1 xxxx xxxxx   8.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     A    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  216 xxxxx  xxxx  496 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  3.3 xxxxx xxxxx  0.3 xxxxx
Shrd StpDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 43.0 xxxxx xxxxx 13.1 xxxxx
Shared LOS:     *    *     *     *    *     *     *    E     *     *    B     *
ApproachDel:      xxxxxx           xxxxxx            43.0              13.1
ApproachLOS:         *                *                E                 B
```

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                    Level Of Service Computation Report
          2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #5 SR 94 / Melody Rd / Procter Valley Rd
********************************************************************************
Average Delay (sec/veh):     40.0    Worst Case Level Of Service:      F[244.2]
********************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:         0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      14  253     3     53  480   238    198    0    10      2    0    44
Growth Adj:  1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
Initial Bse:   14  253     3     53  480   238    198    0    10      2    0    44
User Adj:    1.02 1.02  1.02   1.02 1.02  1.02   1.02 1.02  1.02   1.02 1.02  1.02
PHF Adj:     0.92 0.92  0.92   0.92 0.92  0.92   0.92 0.92  0.92   0.92 0.92  0.92
PHF Volume:    16  281     3     59  532   264    220    0    11      2    0    49
Reduct Vol:     0    0     0      0    0     0      0    0     0      0    0     0
Final Vol.:    16  281     3     59  532   264    220    0    11      2    0    49
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx    4.1 xxxx xxxxx    7.1 xxxx   6.2    7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx    2.2 xxxx xxxxx    3.5 xxxx   3.3    3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  796 xxxx xxxxx    284 xxxx xxxxx   1119 xxxx   664   1100 xxxx   282
Potent Cap.:  835 xxxx xxxxx   1290 xxxx xxxxx    186 xxxx   464    191 xxxx   762
Move Cap.:    835 xxxx xxxxx   1290 xxxx xxxxx    165 xxxx   464    177 xxxx   762
Volume/Cap:  0.02 xxxx  xxxx   0.05 xxxx  xxxx   1.33 xxxx  0.02   0.01 xxxx  0.06
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Queue:        0.1 xxxx xxxxx    0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Stopped Del:  9.4 xxxx xxxxx    7.9 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *      A    *     *      *    *     *      *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx   xxxx xxxx xxxxx   xxxx  170 xxxxx   xxxx  666 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 13.8 xxxxx xxxxx  0.2 xxxxx
Shrd StpDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  244 xxxxx xxxxx 10.9 xxxxx
Shared LOS:     *    *     *      *    *     *      *    F     *      *    B     *
ApproachDel:      xxxxxx           xxxxxx            244.2             10.9
ApproachLOS:         *                *                F                 B
```

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-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Unsignalized Method (Base Volume Alternative)
*******************************************************************************
Intersection #5 SR 94 / Melody Rd / Procter Valley Rd
*******************************************************************************
Average Delay (sec/veh):     2.2   Worst Case Level Of Service:      C[ 20.2]
*******************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       9  521     4    41  180    25    32    0    13     2    0    44
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    9  521     4    41  180    25    32    0    13     2    0    44
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    10  566     4    45  196    27    35    0    14     2    0    48
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    10  566     4    45  196    27    35    0    14     2    0    48
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  223 xxxx xxxxx   571 xxxx xxxxx   910 xxxx   209   893 xxxx   568
Potent Cap.: 1358 xxxx xxxxx  1012 xxxx xxxxx   257 xxxx   836   264 xxxx   526
Move Cap.:   1358 xxxx xxxxx  1012 xxxx xxxxx   225 xxxx   836   249 xxxx   526
Volume/Cap:  0.01 xxxx  xxxx  0.04 xxxx  xxxx  0.15 xxxx  0.02  0.01 xxxx  0.09
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Queue:        0.0 xxxx xxxxx   0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Stopped Del:  7.7 xxxx xxxxx   8.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     A    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  285 xxxxx  xxxx  502 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.6 xxxxx xxxxx  0.3 xxxxx
Shrd StpDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 20.2 xxxxx xxxxx 13.0 xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    B     *
ApproachDel:     xxxxxx           xxxxxx            20.2             13.0
ApproachLOS:        *                *                C                B
```

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--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
            2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #5 SR 94 / Melody Rd / Procter Valley Rd
********************************************************************************
Average Delay (sec/veh):       2.0    Worst Case Level Of Service:       C[ 23.9]
********************************************************************************
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign         Stop Sign
Rights:          Include          Include          Include           Include
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      12  253     3    53  480    41    28    0     8     2    0    44
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   12  253     3    53  480    41    28    0     8     2    0    44
User Adj:    1.02 1.02  1.02  1.02 1.02  1.02  1.02 1.02  1.02  1.02 1.02  1.02
PHF Adj:     0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92  0.92 0.92  0.92
PHF Volume:    13  281     3    59  532    45    31    0     9     2    0    49
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    13  281     3    59  532    45    31    0     9     2    0    49
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx   4.1 xxxx xxxxx   7.1 xxxx   6.2   7.1 xxxx   6.2
FollowUpTim:  2.2 xxxx xxxxx   2.2 xxxx xxxxx   3.5 xxxx   3.3   3.5 xxxx   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  578 xxxx xxxxx   284 xxxx xxxxx  1006 xxxx   555   986 xxxx   282
Potent Cap.: 1006 xxxx xxxxx  1290 xxxx xxxxx   222 xxxx   535   229 xxxx   762
Move Cap.:   1006 xxxx xxxxx  1290 xxxx xxxxx   198 xxxx   535   215 xxxx   762
Volume/Cap:  0.01 xxxx  xxxx  0.05 xxxx  xxxx  0.16 xxxx  0.02  0.01 xxxx  0.06
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Queue:        0.0 xxxx xxxxx   0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Stopped Del:  8.6 xxxx xxxxx   7.9 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     A    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  230 xxxxx  xxxx  686 xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.6 xxxxx xxxxx  0.2 xxxxx
Shrd StpDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 23.9 xxxxx xxxxx 10.7 xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    B     *
ApproachDel:      xxxxxx           xxxxxx            23.9              10.7
ApproachLOS:         *                *                C                 B
```

MITIGATED INTERSECTIONS

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--------------------------------------------------------------------------------
                    Level Of Service Computation Report
          2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #7 SR 94/Melody
********************************************************************************
Cycle (sec):         120                Critical Vol./Cap. (X):        0.237
Loss Time (sec):      12 (Y+R =  4 sec) Average Delay (sec/veh):        12.6
Optimal Cycle:        29                Level Of Service:                  B
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected         Permitted         Permitted
Rights:           Include          Include           Include           Include
Min. Green:    0     0     0    0     0     0    0     0     0    0     0     0
Lanes:        1  0  1  1  0   1  0  1  1  0   1  0  0  1  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      9   521     4   41   180    25   32     0    13    2     0    44
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   9   521     4   41   180    25   32     0    13    2     0    44
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92
PHF Volume:   10   566     4   45   196    27   35     0    14    2     0    48
Reduct Vol:    0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  10   566     4   45   196    27   35     0    14    2     0    48
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:   10   566     4   45   196    27   35     0    14    2     0    48
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  0.95 0.95  0.95 0.95 0.93  0.93 0.77 1.00  0.85 0.86 1.00  0.86
Lanes:       1.00 1.98  0.02 1.00 1.76  0.24 1.00 0.00  1.00 0.04 0.00  0.96
Final Sat.:  1805 3579    27 1805 3113   432 1459    0  1615   71    0  1572
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.16  0.16 0.02 0.06  0.06 0.02 0.00  0.01 0.03 0.00  0.03
Crit Moves:       ****       ****                                ****
Green/Cycle: 0.06 0.67  0.67 0.10 0.71  0.71 0.13 0.00  0.13 0.13 0.00  0.13
Volume/Cap:  0.09 0.24  0.24 0.24 0.09  0.09 0.19 0.00  0.07 0.24 0.00  0.24
Uniform Del: 53.2  7.9   7.9 49.4  5.4   5.4 46.7  0.0  46.0 47.0  0.0  47.0
IncremntDel:  0.3  0.1   0.1  0.7  0.0   0.0  0.5  0.0   0.1  0.6  0.0   0.6
InitQueuDel:  0.0  0.0   0.0  0.0  0.0   0.0  0.0  0.0   0.0  0.0  0.0   0.0
Delay Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 0.00  1.00 1.00 0.00  1.00
Delay/Veh:   53.5  7.9   7.9 50.0  5.4   5.4 47.2  0.0  46.1 47.6  0.0  47.6
User DelAdj: 0.91 0.91  0.91 0.91 0.91  0.91 0.91 0.91  0.91 0.91 0.91  0.91
AdjDel/Veh:  48.7  7.2   7.2 45.5  4.9   4.9 42.9  0.0  42.0 43.3  0.0  43.3
HCM2kAvg:       0    4     4    2    1     1    2    0     0    2    0     2
********************************************************************************
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                   Level Of Service Computation Report
          2000 HCM Operations Method (Base Volume Alternative)
********************************************************************************
Intersection #7 SR 94/Melody
********************************************************************************
Cycle (sec):         120              Critical Vol./Cap. (X):        0.326
Loss Time (sec):      12 (Y+R =  4 sec) Average Delay (sec/veh):      14.6
Optimal Cycle:        32              Level Of Service:                 B
********************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected         Permitted        Permitted
Rights:            Include          Include          Include          Include
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Lanes:         1  0  1  1  0   1  0  1  1  0   1  0  0  1  0   0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      12  253     3   53  480    41   28    0     8    2    0    44
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   12  253     3   53  480    41   28    0     8    2    0    44
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92 0.92 0.92  0.92
PHF Volume:    13  275     3   58  522    45   30    0     9    2    0    48
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   13  275     3   58  522    45   30    0     9    2    0    48
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Vol.:    13  275     3   58  522    45   30    0     9    2    0    48
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900  1900
Adjustment:  0.64 0.64  0.64 0.64 0.63  0.63 0.52 0.67  0.57 0.58 0.67  0.58
Lanes:       1.00 1.98  0.02 1.00 1.84  0.16 1.00 0.00  1.00 0.04 0.00  0.96
Final Sat.:  1209 2386    28 1209 2202   188  985    0  1082   48    0  1054
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.12  0.12 0.05 0.24  0.24 0.03 0.00  0.01 0.05 0.00  0.05
Crit Moves:  ****                 ****                            ****
Green/Cycle: 0.03 0.54  0.54 0.22 0.73  0.73 0.14 0.00  0.14 0.14 0.00  0.14
Volume/Cap:  0.33 0.21  0.21 0.21 0.33  0.33 0.22 0.00  0.06 0.33 0.00  0.33
Uniform Del: 56.7 14.5  14.5 38.1  5.8   5.8 45.9  0.0  44.8 46.6  0.0  46.6
IncremntDel:  4.7  0.1   0.1  0.4  0.1   0.1  0.8  0.0   0.2  1.2  0.0   1.2
InitQueuDel:  0.0  0.0   0.0  0.0  0.0   0.0  0.0  0.0   0.0  0.0  0.0   0.0
Delay Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 0.00  1.00 1.00 0.00  1.00
Delay/Veh:   61.4 14.5  14.5 38.5  5.9   5.9 46.7  0.0  45.0 47.8  0.0  47.8
User DelAdj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
AdjDel/Veh:  61.4 14.5  14.5 38.5  5.9   5.9 46.7  0.0  45.0 47.8  0.0  47.8
HCM2kAvg:       1    3     3    2    4     4    1    0     0    2    0     2
********************************************************************************
```

APPENDIX E

ILV ANALYSIS WORKSHEETS

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Jamacha / Campo Road

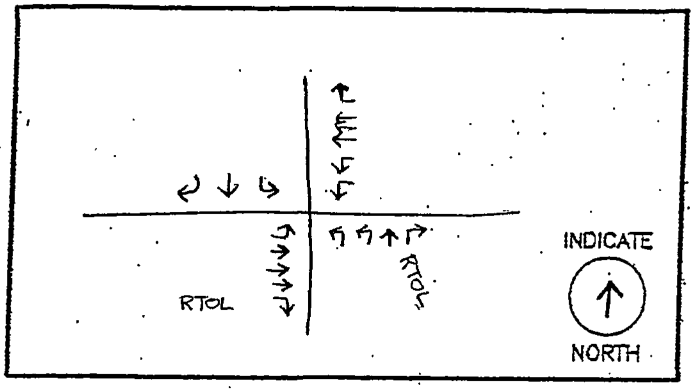
Existing Am

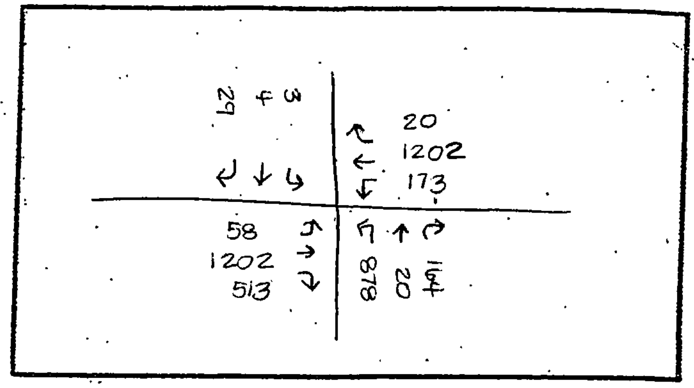
DIST. CO. RTE. P.M. ______

BY ______ DATE 30 June 2004

TIME ______ AM PM

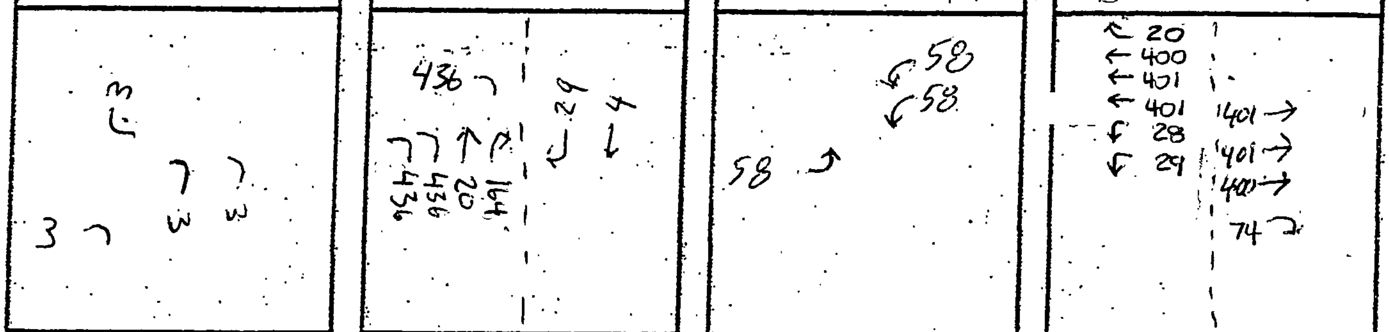
DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	2 PHASE 2 3	PHASE 3 4	5 PHASE 4 6



CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2		PHASE 3	PHASE 4	
3	436	29	58	401	401

TOTAL OPERATING LEVEL (ILV/HR)

Σ
1328

IS . . .

- ☐ < 1200 ILV/HR.
- ☑ > 1200 BUT < 1500 ILV/HR. At Capacity
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Jamacha / Campo Road

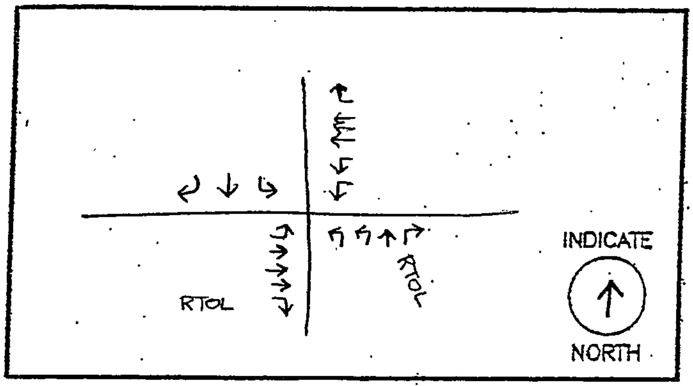
Existing PM

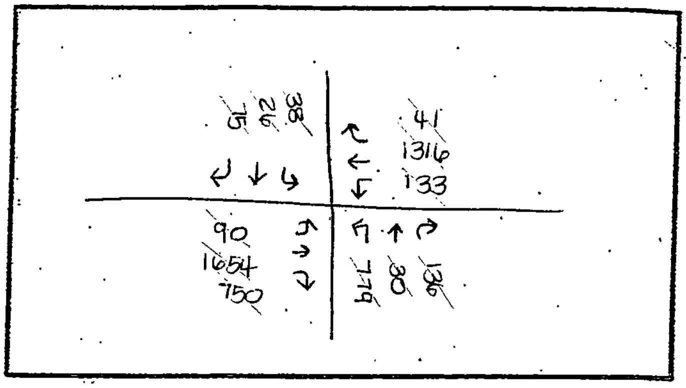
DIST. CO. RTE. P.M. ______

BY ______ DATE 30 June 2004

TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
38 38 38 38	352 352 351 30 136	75 26 66 67 90	41 439 438 439 551 551 552 360

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
38	352	75 | 90	552

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
1107

☑ < 1200 ILV/HR.

☐ > 1200 BUT < 1500 ILV/HR.

☑ > 1500 ILV/HR (CAPACITY)

Under capacity

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

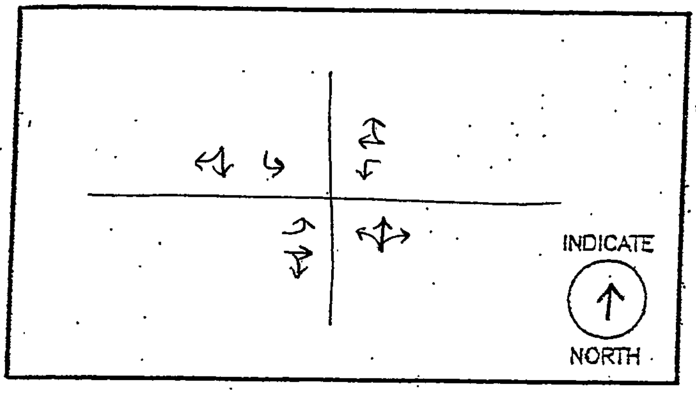
INTERSECTION Steele Canyon Rd / Campo Rd
Existing AM

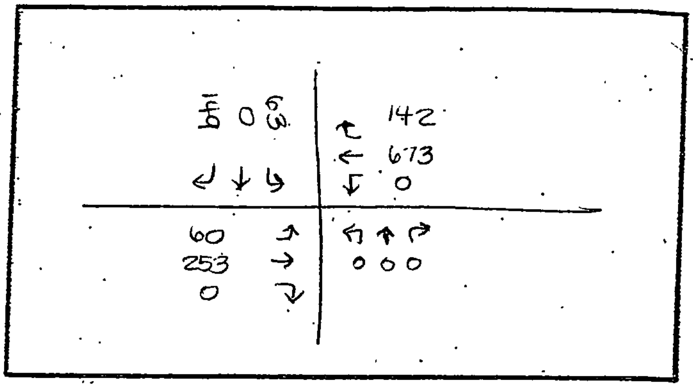
DIST. CO. RTE. P.M. ______

BY ______ DATE 30 June 2004

TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
60 60	193 193	622	149 63

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
60	193	622	149

TOTAL OPERATING LEVEL (ILV/HR)

Σ
1024

IS . . . Under Capacity

- ☑ < 1200 ILV/HR.
- ☐ > 1200 BUT < 1500 ILV/HR.
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

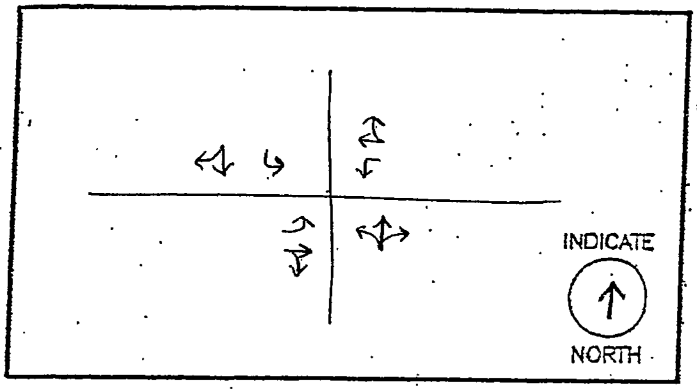
INTERSECTION

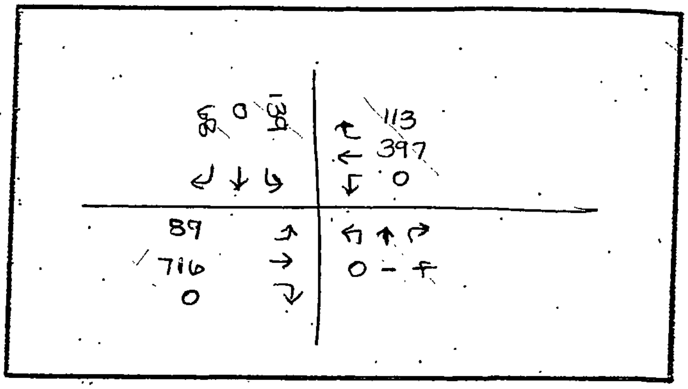
Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Steele Canyon Rd / Campo Rd
Existing pm

DIST. CO. RTE. P.M. ______
BY ______ DATE 30 June 2004
TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
510 510	89 206	88 139	5

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
510	206	139	5

TOTAL OPERATING LEVEL (ILV/HR)

Σ
860

IS . . .

- ☑ < 1200 ILV/HR.
- ☐ > 1200 BUT < 1500 ILV/HR.
- ☐ > 1500 ILV/HR (CAPACITY)

Under Capacity

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

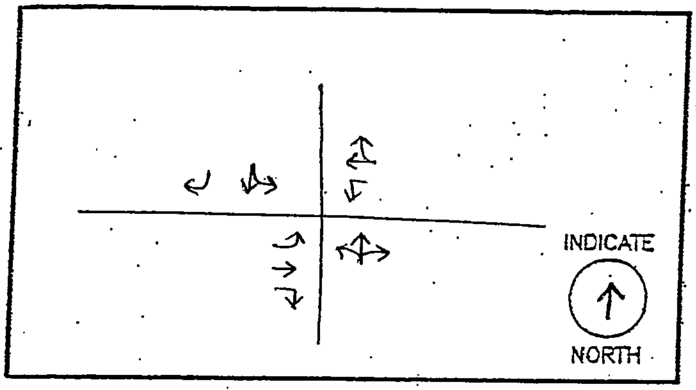
INTERSECTION Jefferson Road / Campo Road
Existing AM

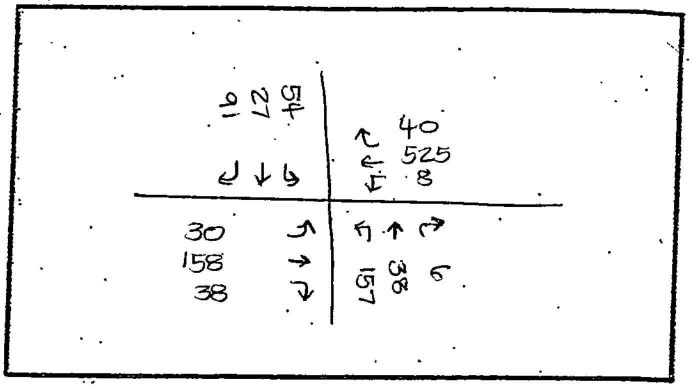
DIST. CO. RTE. P.M. ____________

BY ______ DATE 30 June 2004

TIME ______ AM PM

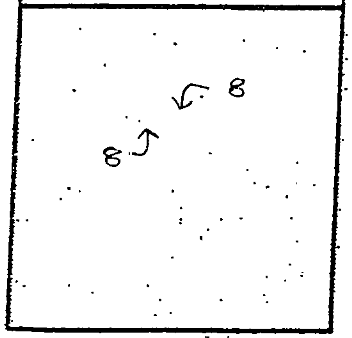
DIAGRAM AND TRAFFIC FLOWS:



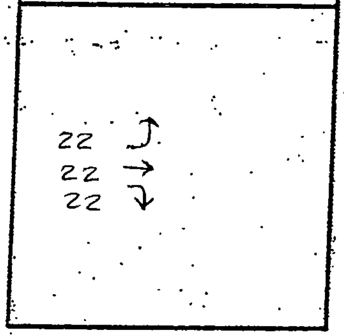


LANE VOLUMES (ILV/HR)

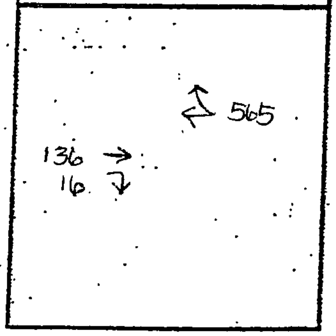
PHASE 1



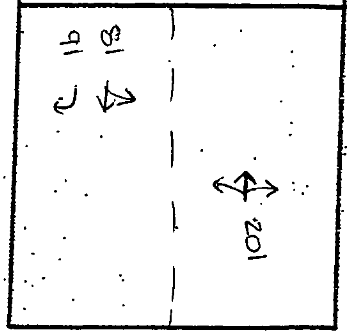
PHASE 2



PHASE 3



PHASE 4



CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
8	22	565	91 / 201

TOTAL OPERATING LEVEL (ILV/HR)

Σ
887

IS . . .

Under Capacity

☑ < 1200 ILV/HR.

☐ > 1200, BUT < 1500 ILV/HR.

☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

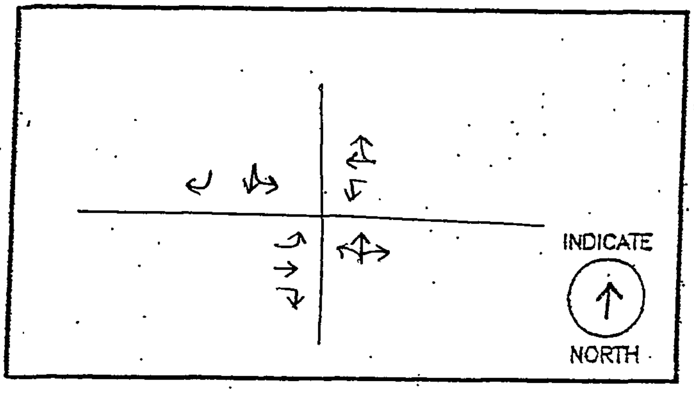
INTERSECTION Jefferson Road / Campo Road
Existing PM

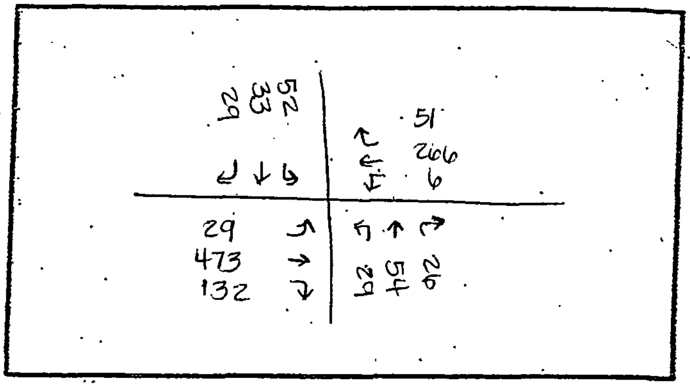
DIST. CO. RTE. P.M. ______

BY ______ DATE 30 June 2004

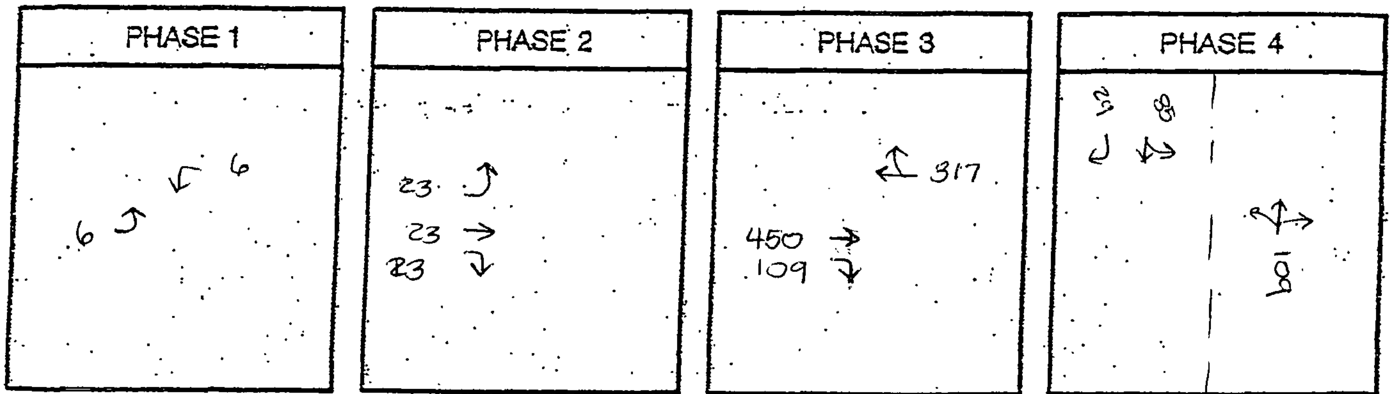
TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)



CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
6	23	450	85 | 109

TOTAL OPERATING LEVEL (ILV/HR)

Σ
673

IS . . . Under Capacity

- ☑ < 1200 ILV/HR.
- ☐ > 1200, BUT < 1500 ILV/HR.
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

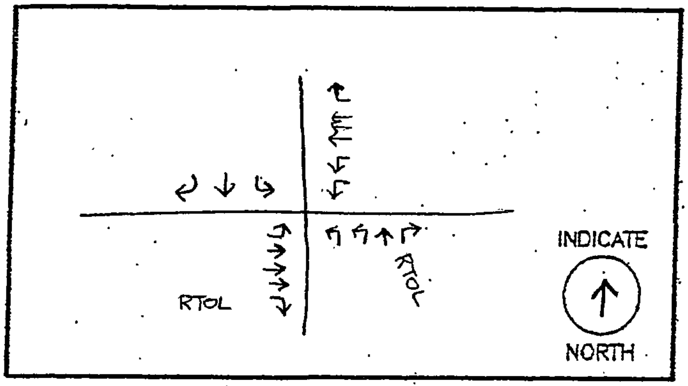
INTERSECTION Jamacha / Campo Road
Existing + Project AM

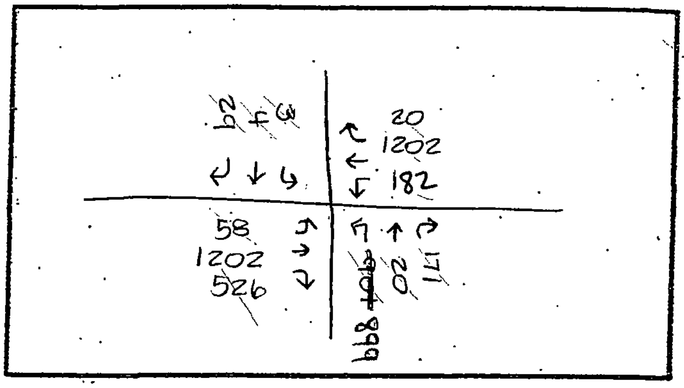
DIST. CO. RTE. P.M. ______

BY ______ DATE 30 June 2004

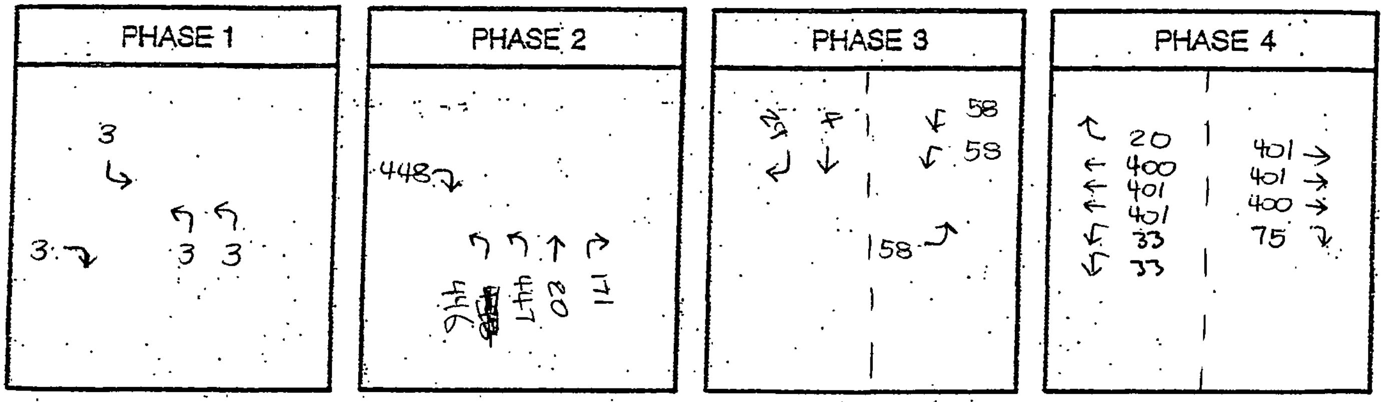
TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)



CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
3	447	29 | 58	401 | 401

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
1339

☐ < 1200 ILV/HR.

At capacity ☑ > 1200, BUT < 1500 ILV/HR.

☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

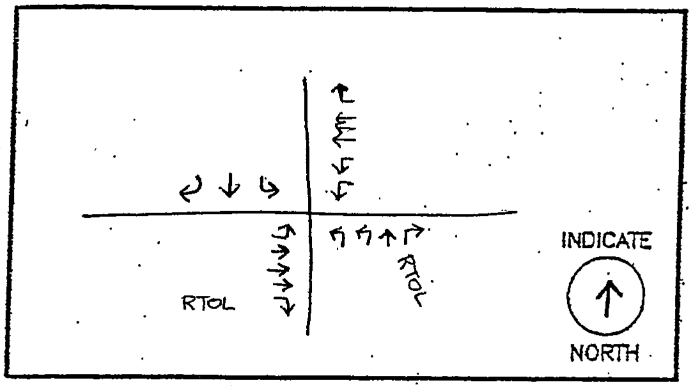
INTERSECTION Jamacha / Campo Road
Existing + Project PM

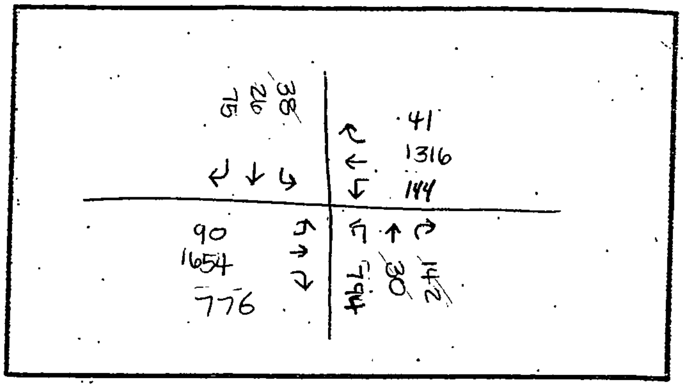
DIST. CO. RTE. P.M. ____________

BY ______ DATE 30 June 2004

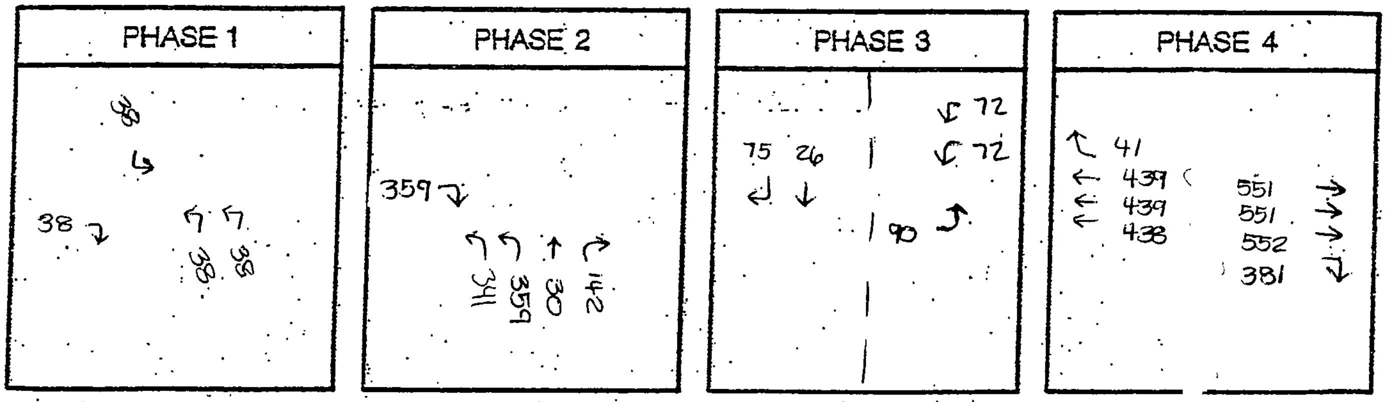
TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)



CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
38	359	75 / 90	552

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
1114

☑ < 1200 ILV/HR.

☐ > 1200 BUT < 1500 ILV/HR.

Under capacity ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Steele Canyon Rd. / Campo Rd

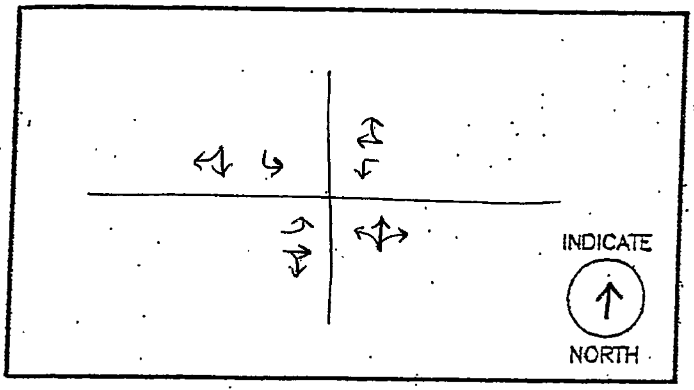
Existing + Project AM

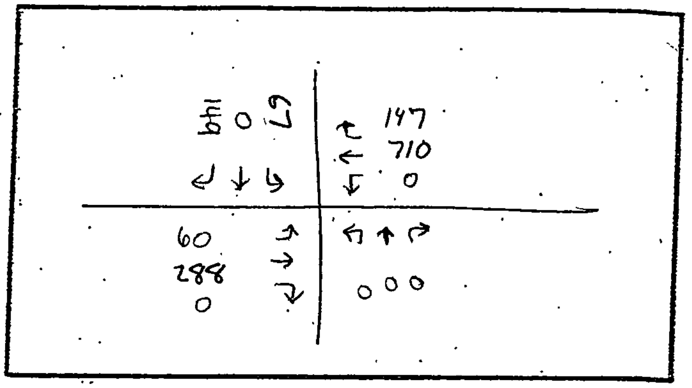
DIST. CO. RTE. P.M. ______

BY ______ DATE 30 June 2004

TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
60 601	228 228	629	149

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
60	228	629	149

TOTAL OPERATING LEVEL (ILV/HR)

Σ
1066

IS . . .

Under Capacity

☑ < 1200 ILV/HR.

☐ > 1200 BUT < 1500 ILV/HR.

☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Steele Canyon Rd / Campo Rd

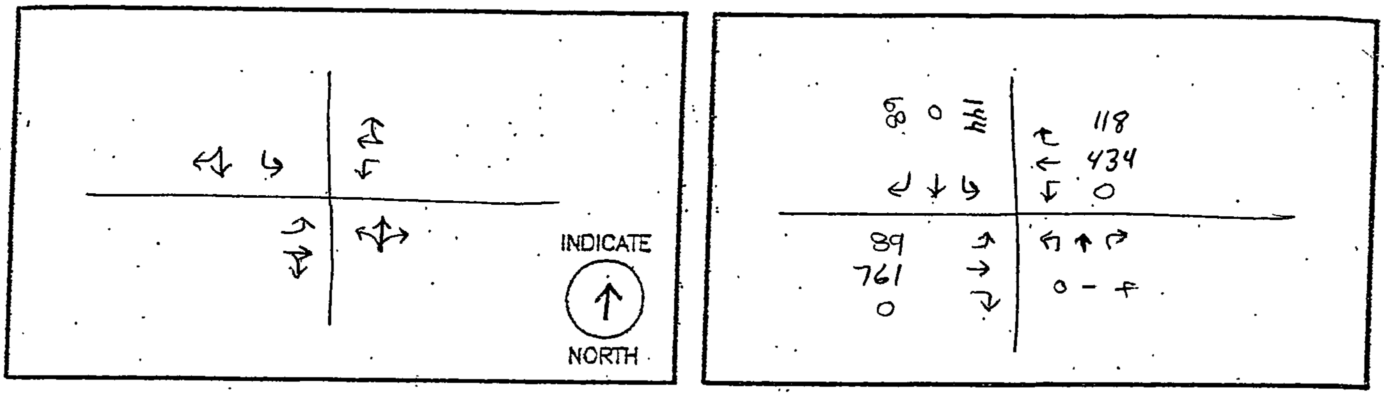
Existing + Project PM

DIST. CO. RTE. P.M. ______

BY ______ DATE 30 June 2004

TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:



LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
89, 89	552, 552	120	8, 144 | 5

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
89	552	120	144 | 5

TOTAL OPERATING LEVEL (ILV/HR)

Σ
910

IS . . .

Under Capacity

- ☑ < 1200 ILV/HR.
- ☐ > 1200, BUT < 1500 ILV/HR.
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

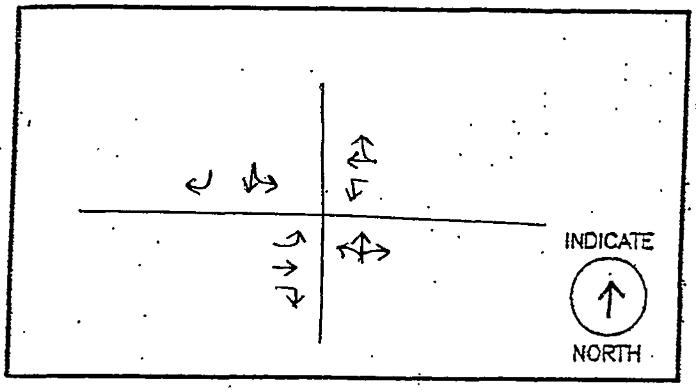
INTERSECTION Jefferson Road / Campo Road
Existing + Project AM

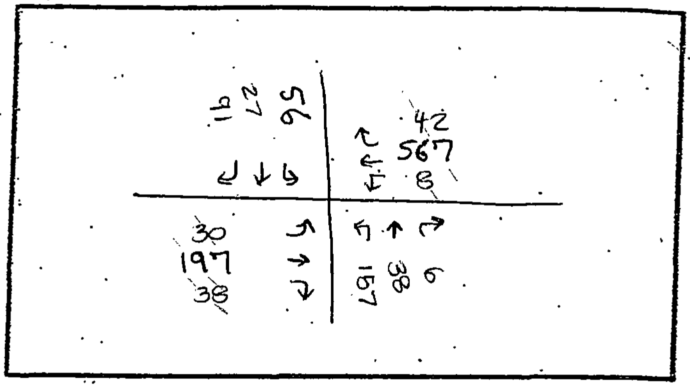
DIST. CO. RTE. P.M. ______

BY ______ DATE 30 June 2004

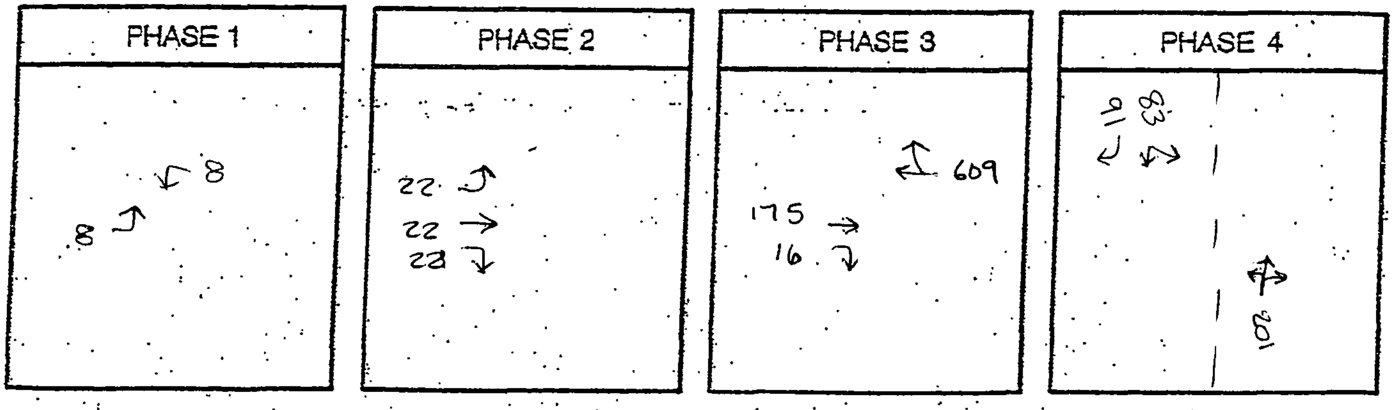
TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)



CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
8	22	609	91 / 201

TOTAL OPERATING LEVEL (ILV/HR)

Σ
931

IS . . . Under Capacity

- ☑ < 1200 ILV/HR.
- ☐ > 1200, BUT < 1500 ILV/HR.
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

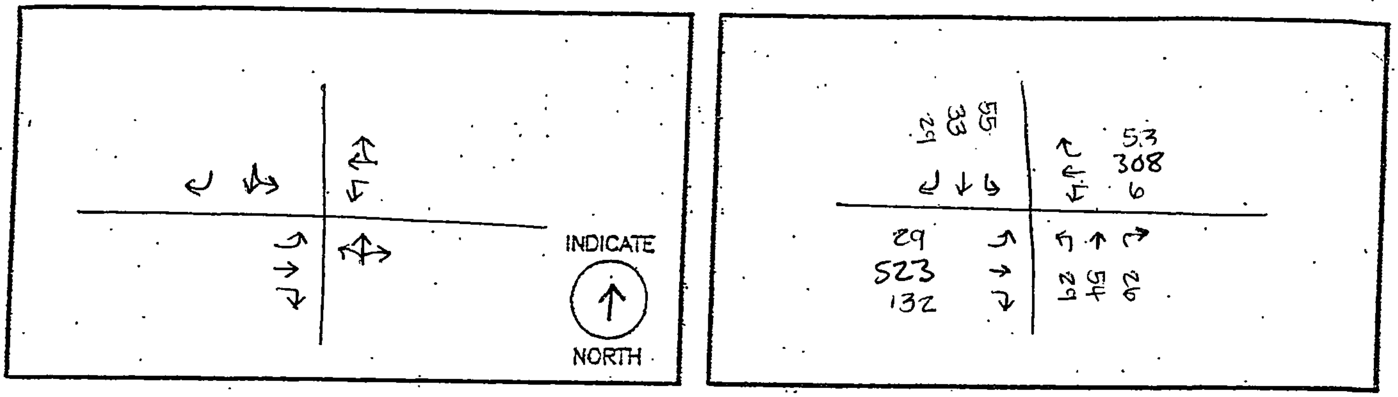
INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Jefferson Road / Campo Road
Existing + Project PM

DIST. CO. RTE. P.M. ______
BY ______ DATE 30 June 2004
TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:



LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
6, 6	23, 23, 23	361, 500, 109	29, 88, 109

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
6	23	500	88 / 109

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
726

Under Capacity

- ☑ < 1200 ILV/HR.
- ☐ > 1200, BUT < 1500 ILV/HR.
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

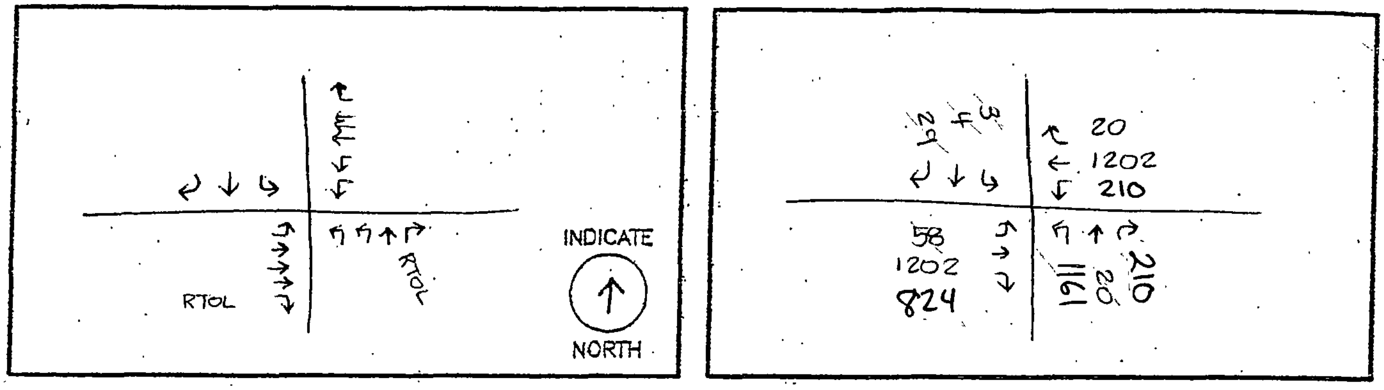
Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Jamacha / Campo Road DIST. CO. RTE. P.M. ______

Existing + Project + Cumulative AM BY ______ DATE 2/25/05

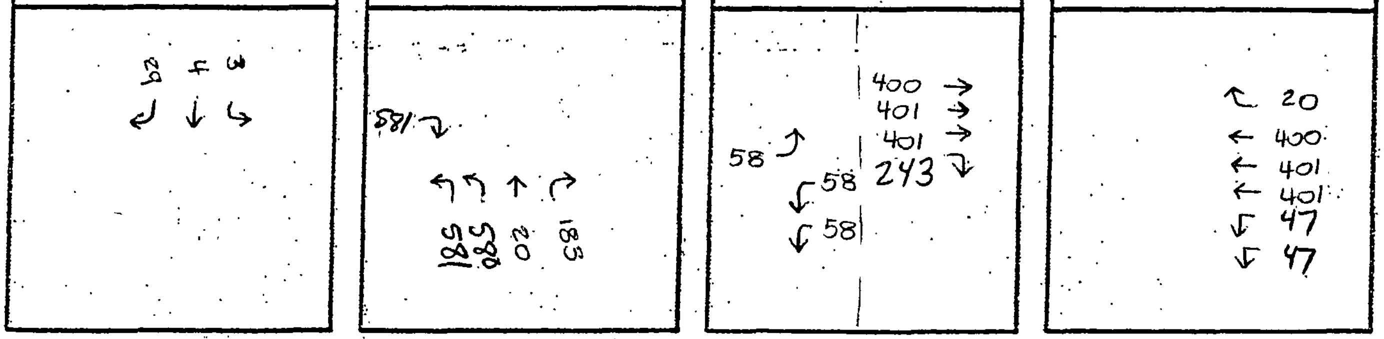
TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:



LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4



CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
29	581	58 | 401	401

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
1470

At capacity

- ☐ < 1200 ILV/HR.
- ☑ > 1200 BUT < 1500 ILV/HR.
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

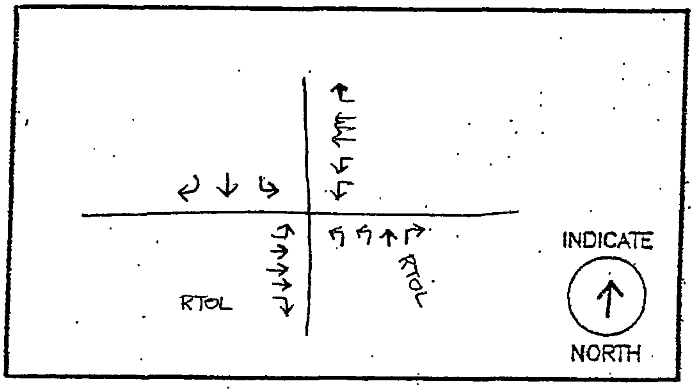
INTERSECTION Jamacha / Campo Road
Existing + Project + Cumulative PM

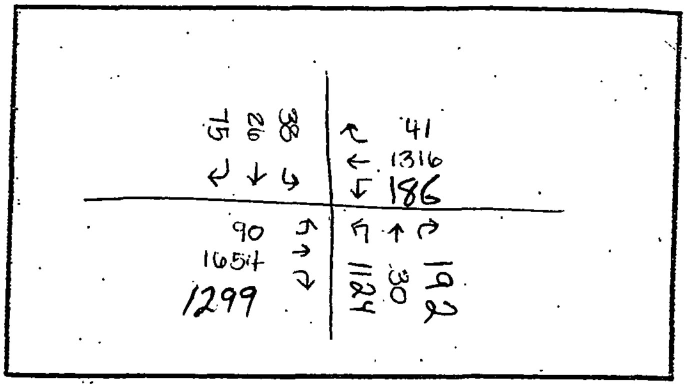
DIST. CO. RTE. P.M. ______

BY ______ DATE 2/25/05

TIME ______ AM PM

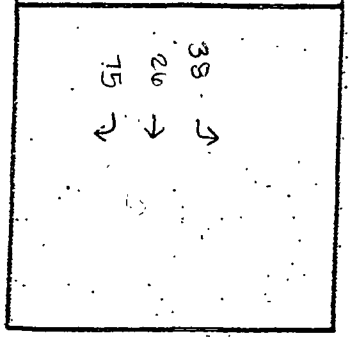
DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1



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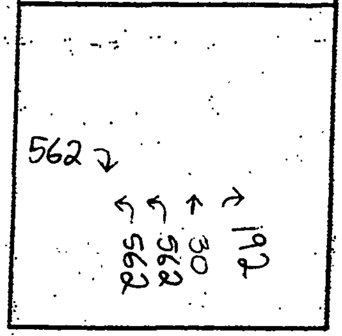

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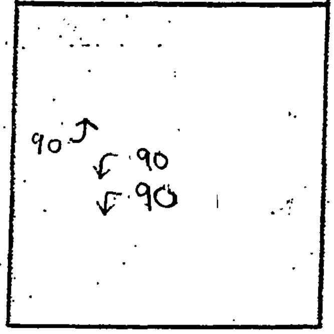

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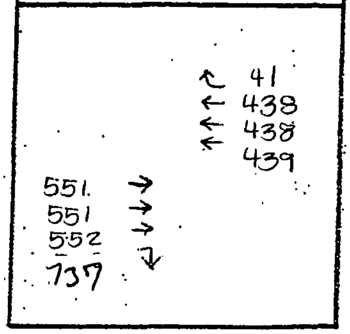


CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
75	562	90	737

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
1464

- ☐ < 1200 ILV/HR.
- ☑ > 1200 BUT < 1500 ILV/HR. At capacity
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

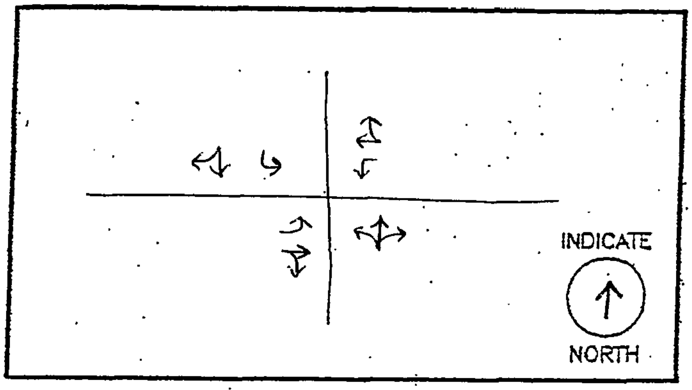
INTERSECTION Steele Canyon Rd. / Campo Rd
Existing + Project + Cumulative
AM

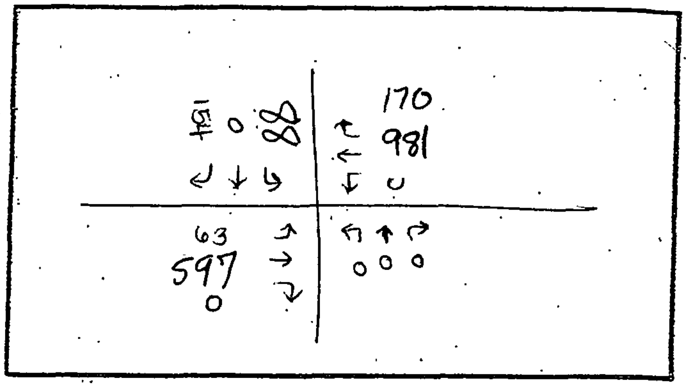
DIST. CO. RTE. P.M. ______

BY ______ DATE 2/25/05

TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
154 88	63 63	534 534	617

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
154	63	534	617

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
1368

At capacity

- ☐ < 1200 ILV/HR.
- ☑ > 1200 BUT < 1500 ILV/HR.
- ☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Steele Canyon Rd / Campo Rd

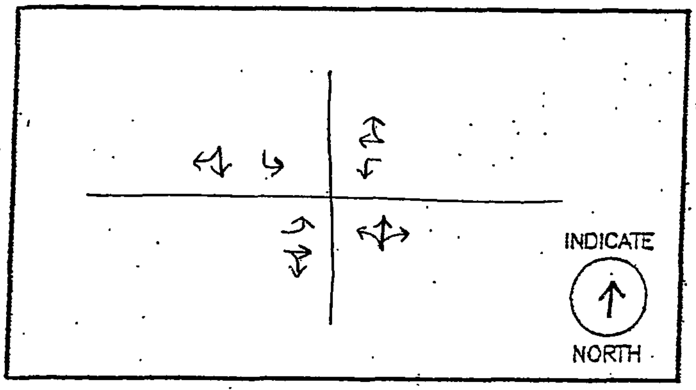
Existing + Project + Cumulative PM

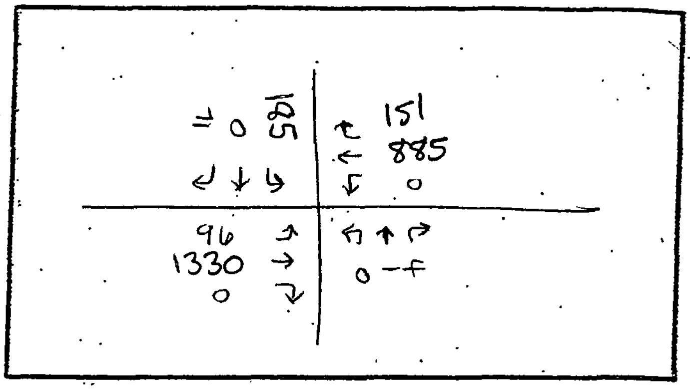
DIST. CO. RTE. P.M. ______

BY ______ DATE 2/25/05

TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
185	5	96 96	802 1234

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
185	5	96	1234

TOTAL OPERATING LEVEL (ILV/HR)

Σ
1520

IS . . .

- ☐ < 1200 ILV/HR.
- ☑ > 1200 BUT < 1500 ILV/HR.
- ☒ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

INTERSECTION

Signalized Intersection
CAPACITY ANALYSIS

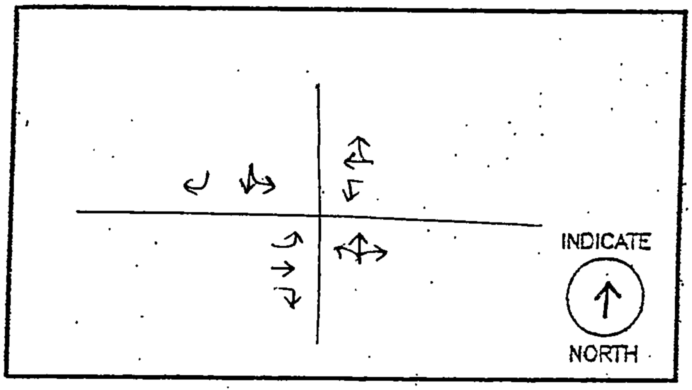
INTERSECTION Jefferson Road / Campo Road
Existing + Project + Cumulative AM

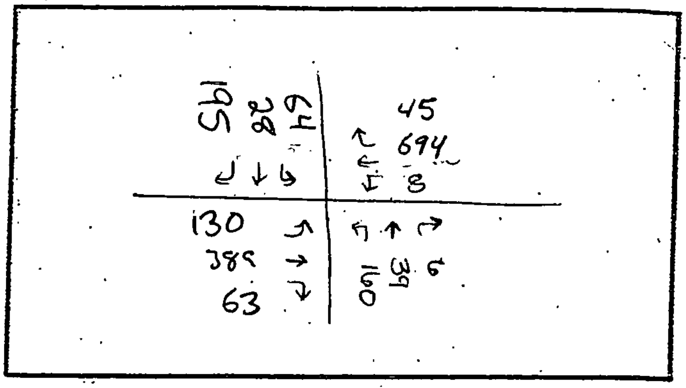
DIST. CO. RTE. P.M. ______

BY ______ DATE 2/25/05

TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
195, 92	205	8, 8, 23, 23, 23	739, 366, 40

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
195	205	8 23	739

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
1170

☑ < 1200 ILV/HR.

Under Capacity ☐ > 1200 BUT < 1500 ILV/HR.

☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

Project 1266

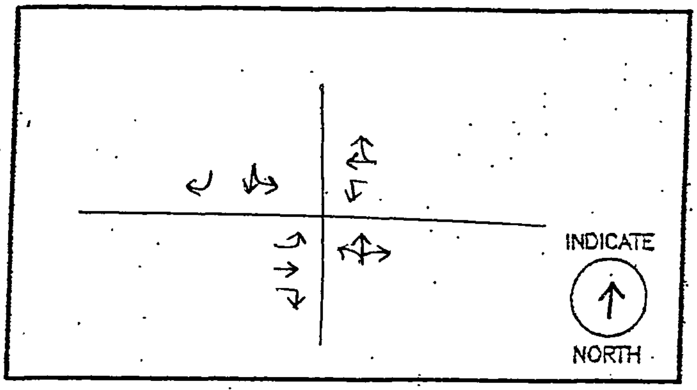
INTERSECTION

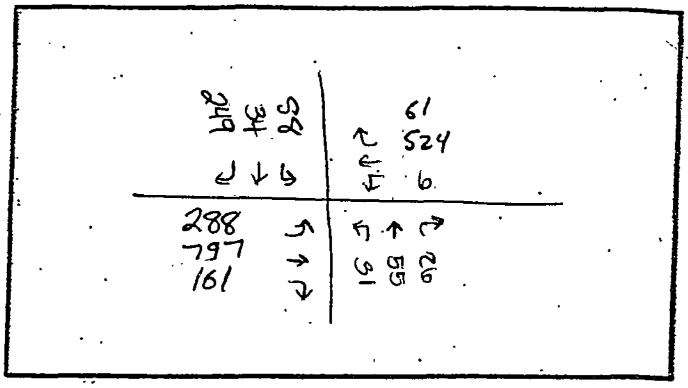
Signalized Intersection
CAPACITY ANALYSIS

INTERSECTION Jefferson Road / Campo Road
Existing + Project + Cumulative. PM

DIST. CO. RTE. P.M. ______
BY ______ DATE 2/25/05
TIME ______ AM PM

DIAGRAM AND TRAFFIC FLOWS:





LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
249 92	112	6 6 288 288 161	585 509 0

CRITICAL LANE VOLUMES (ILV/HR)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
249	112	6 | 288	585

TOTAL OPERATING LEVEL (ILV/HR) IS . . .

Σ
1240

☑ < 1200 ILV/HR.

under capacity. ☐ > 1200 BUT < 1500 ILV/HR.

☐ > 1500 ILV/HR (CAPACITY)

REMARKS:

APPENDIX F

COUNTY OF SAN DIEGO ROADWAY CLASSIFICATION, AND LEVEL OF SERVICE TABLE

County of San Diego
DRAFT

August 11, 1998

TABLE 1

AVERAGE DAILY VEHICLE TRIPS

CIRCULATION ELEMENT ROADS — **LEVEL OF SERVICE**

CLASS	X-SECTION	A	B	C	D	E
Expressway	126/146	<36,000	<54,000	<70,000	<86,000	<108,000
Prime Arterial	102/122	<22,200	<37,000	<44,600	<50,000	<57,000
Major Road	78/98	<14,800	<24,700	<29,600	<33,400	<37,000
Collector	64/84	<13,700	<22,800	<27,400	<30,800	<34,200
Town Collector	54/74	<3,000	<6,000	<9,500	<13,500	<19,000
Light Collector	40/60	<1,900	<4,100	<7,100	<10,900	<16,200
Rural Collector	40/84	<1,900	<4,100	<7,100	<10,900	<16,200
Rural Light Collector	40/60	<1,900	<4,100	<7,100	<10,900	<16,200
Recreational Parkway	40/100	<1,900	<4,100	<7,100	<10,900	<16,200
Rural Mountain	40/100	<1,900	<4,100	<7,100	<10,900	<16,200

NON-CIRCULATION ELEMENT ROADS — **LEVEL OF SERVICE**

CLASS	X-SECTION	A	B	C	D	E
Residential Collector	40/60	*	*	<4,500	*	*
Residential Road	36/56	*	*	<1,500	*	*
Residential Cul-de-sac or Loop Road	32/52	*	*	< 200	*	*

* Levels of service are not applicable to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

APPENDIX G

TWO-LANE HIGHWAY ANALYSIS SHEETS

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	7/15/2004
Analysis Time Period	AM
Highway	SR 94
From/To	Jamacha Rd. to Steel Canyon Rd
Jurisdiction	San Diego County
Analysis Year	Existing
Description	Peaceful Valley Ranch

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1752 veh/h
Directional split 61 / 39 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1914	pc/h
Highest directional split proportion (note-2)	1168	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	43.1	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1904	pc/h
Highest directional split proportion (note-2)	1161	
Base percent time-spent-following, BPTSP	81.2	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	81.2	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.60	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

```
                HCS2000: Two-Lane Highways Release 4.1d



Phone:                                 Fax:
E-Mail:

_________________Two-Way Two-Lane Highway Segment Analysis_________________

Analyst                 NP
Agency/Co.              LLG
Date Performed          7/15/2004
Analysis Time Period    PM
Highway                 SR 94
From/To                 Jamacha Rd. to Steel Canyon Rd
Jurisdiction            San Diego County
Analysis Year           Existing
Description  Peaceful Valley Ranch

________________________________Input Data_________________________________

Highway class  Class 1
Shoulder width       6.0     ft     Peak-hour factor, PHF       0.92
Lane width           12.0    ft     % Trucks and buses          5        %
Segment length       0.0     mi     % Recreational vehicles     4        %
Terrain type         Level          % No-passing zones          0        %
Grade:  Length               mi     Access points/mi            8        /mi
        Up/down              %

Two-way hourly volume, V    1854    veh/h
Directional split       51  /   49  %

___________________________Average Travel Speed____________________________

Grade adjustment factor, fG                       1.00
PCE for trucks, ET                                1.1
PCE for RVs, ER                                   1.0
Heavy-vehicle adjustment factor,                  0.995
Two-way flow rate,(note-1) vp                     2025     pc/h
Highest directional split proportion (note-2)     1033     pc/h

Free-Flow Speed from Field Measurement:
Field measured speed, SFM                          -       mi/h
Observed volume, Vf                                -       veh/h
Estimated Free-Flow Speed:
Base free-flow speed, BFFS                        60.0     mi/h
Adj. for lane and shoulder width, fLS             0.0      mi/h
Adj. for access points, fA                        2.0      mi/h

Free-flow speed, FFS                              58.0     mi/h

Adjustment for no-passing zones, fnp              0.0      mi/h
Average travel speed, ATS                         42.3     mi/h



__________________________Percent Time-Spent-Following_____________________

Grade adjustment factor, fG                                  1.00
PCE for trucks, ET                                           1.0
PCE for RVs, ER                                              1.0
Heavy-vehicle adjustment factor, fHV                         1.000
Two-way flow rate,(note-1) vp                                2015    pc/h
Highest directional split proportion (note-2)                1028
Base percent time-spent-following, BPTSF                     83.0    %
Adj.for directional distribution and no-passing zones, fd/np 0.0
Percent time-spent-following, PTSF                           83.0    %

_______________Level of Service and Other Performance Measures_____________

Level of service, LOS                                        E

Volume to capacity ratio, v/c                                0.63
Peak 15-min vehicle-miles of travel, VMT15                   0       veh-mi
Peak-hour vehicle-miles of travel, VMT60                     0       veh-mi
Peak 15-min total travel time, TT15                          0.0     veh-h
____________________________________________________________________________

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate
   analysis-the LOS is F.
```

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	7/15/2004
Analysis Time Period	AM
Highway	SR 94
From/To	Steel Canyon Rd. to Lyons V. R
Jurisdiction	San Diego County
Analysis Year	Existing
Description	Peaceful Valley Ranch

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1131 veh/h
Directional split 72 / 28 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1235	pc/h
Highest directional split proportion (note-2)	889	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	48.4	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1229	pc/h
Highest directional split proportion (note-2)	885	
Base percent time-spent-following, BPTSF	66.1	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	66.1	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.39	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

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________________Two-Way Two-Lane Highway Segment Analysis_______________

Analyst                NP
Agency/Co.             LLG
Date Performed         7/15/2004
Analysis Time Period   PM
Highway                SR 94
From/To                Steel Canyon Rd to Lyons V. Rd
Jurisdiction           San Diego County
Analysis Year          Existing
Description  Peaceful Valley Ranch

_______________________________Input Data_______________________________

Highway class  Class 1
Shoulder width       6.0     ft     Peak-hour factor, PHF        0.92
Lane width           12.0    ft     % Trucks and buses           5        %
Segment length       0.0     mi     % Recreational vehicles      4        %
Terrain type         Level          % No-passing zones           0        %
Grade:  Length               mi     Access points/mi             8        /mi
        Up/down              %

Two-way hourly volume, V    1369    veh/h
Directional split       63  /   37  %

___________________________Average Travel Speed_________________________

Grade adjustment factor, fG                      1.00
PCE for trucks, ET                               1.1
PCE for RVs, ER                                  1.0
Heavy-vehicle adjustment factor,                 0.995
Two-way flow rate,(note-1) vp                    1495     pc/h
Highest directional split proportion (note-2)    942      pc/h

Free-Flow Speed from Field Measurement:
Field measured speed, SFM                        -        mi/h
Observed volume, Vf                              -        veh/h
Estimated Free-Flow Speed:
Base free-flow speed, BFFS                       60.0     mi/h
Adj. for lane and shoulder width, fLS            0.0      mi/h
Adj. for access points, fA                       2.0      mi/h

Free-flow speed, FFS                             58.0     mi/h

Adjustment for no-passing zones, fnp             0.0      mi/h
Average travel speed, ATS                        46.4     mi/h


_________________________Percent Time-Spent-Following____________________

Grade adjustment factor, fG                                 1.00
PCE for trucks, ET                                          1.0
PCE for RVs, ER                                             1.0
Heavy-vehicle adjustment factor, fHV                        1.000
Two-way flow rate,(note-1) vp                               1488     pc/h
Highest directional split proportion (note-2)               937
Base percent time-spent-following, BPTSF                    73.0     %
Adj.for directional distribution and no-passing zones, fd/np 0.0
Percent time-spent-following, PTSF                          73.0     %

_______________Level of Service and Other Performance Measures___________

Level of service, LOS                                       D
Volume to capacity ratio, v/c                               0.47
Peak 15-min vehicle-miles of travel, VMT15                  0        veh-mi
Peak-hour vehicle-miles of travel, VMT60                    0        veh-mi
Peak 15-min total travel time, TT15                         0.0      veh-h
_________________________________________________________________________

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate
   analysis-the LOS is F.
```

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	7/15/2004
Analysis Time Period	AM
Highway	SR 94
From/To	Lyons Valley Rd. to Jefferson
Jurisdiction	San Diego County
Analysis Year	Existing
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 847 veh/h
Directional split 79 / 21 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.990	
Two-way flow rate,(note-1) vp	930	pc/h
Highest directional split proportion (note-2)	735	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	50.8	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.995	
Two-way flow rate,(note-1) vp	925	pc/h
Highest directional split proportion (note-2)	731	
Base percent time-spent-following, BPTSF	55.7	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	55.7	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.29	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	7/15/2004
Analysis Time Period	PM
Highway	SR 94
From/To	Lyons Valley Rd. to Jefferson
Jurisdiction	San Diego County
Analysis Year	Existing
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 999 veh/h
Directional split 57 / 43 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.990	
Two-way flow rate,(note-1) vp	1097	pc/h
Highest directional split proportion (note-2)	625	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	49.5	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.995	
Two-way flow rate,(note-1) vp	1091	pc/h
Highest directional split proportion (note-2)	622	
Base percent time-spent-following, BPTSF	61.7	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	61.7	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.34	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
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Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	7/15/2004
Analysis Time Period	AM
Highway	SR 94
From/To	Jefferson Rd. to Melody Rd.
Jurisdiction	San Diego County
Analysis Year	Existing
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 791 veh/h
Directional split 72 / 28 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.990	
Two-way flow rate,(note-1) vp	868	pc/h
Highest directional split proportion (note-2)	625	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	51.3	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.995	
Two-way flow rate,(note-1) vp	864	pc/h
Highest directional split proportion (note-2)	622	
Base percent time-spent-following, BPTSF	53.2	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	53.2	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.27	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
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Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	7/15/2004
Analysis Time Period	PM
Highway	SR 94
From/To	Jefferson Rd. to Melody Rd.
Jurisdiction	San Diego County
Analysis Year	Existing
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 874 veh/h
Directional split 63 / 37 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.990	
Two-way flow rate,(note-1) vp	959	pc/h
Highest directional split proportion (note-2)	604	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	50.6	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.995	
Two-way flow rate,(note-1) vp	955	pc/h
Highest directional split proportion (note-2)	602	
Base percent time-spent-following, BPTSF	56.8	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	56.8	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.30	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

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Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	AM
Highway	SR 94
From/To	Jamacha Rd. to Steel Canyon Rd
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1845 veh/h
Directional split 61 / 39 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	2015	pc/h
Highest directional split proportion (note-2)	1229	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	42.4	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2005	pc/h
Highest directional split proportion (note-2)	1223	
Base percent time-spent-following, BPTSF	82.8	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	82.8	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.63	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

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Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	PM
Highway	SR 94
From/To	Jamacha Rd. to Steel Canyon Rd
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1936 veh/h
Directional split 51 / 49 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	2115	pc/h
Highest directional split proportion (note-2)	1079	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	41.6	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2104	pc/h
Highest directional split proportion (note-2)	1073	
Base percent time-spent-following, BPTSF	84.3	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	84.3	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.66	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	AM
Highway	SR 94
From/To	Steel Canyon Rd. to Lyons V. R
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1212 veh/h
Directional split 72 / 28 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1324	pc/h
Highest directional split proportion (note-2)	953	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	47.7	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1317	pc/h
Highest directional split proportion (note-2)	948	
Base percent time-spent-following, BPTSF	68.6	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	68.6	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.41	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	PM
Highway	SR 94
From/To	Steel Canyon Rd to Lyons V. Rd
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1461 veh/h
Directional split 63 / 37 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1596	pc/h
Highest directional split proportion (note-2)	1005	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	45.6	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1588	pc/h
Highest directional split proportion (note-2)	1000	
Base percent time-spent-following, BPTSF	75.2	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	75.2	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.50	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	AM
Highway	SR 94
From/To	Lyons Valley Rd. to Jefferson
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 928 veh/h
Directional split 79 / 21 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.990	
Two-way flow rate,(note-1) vp	1019	pc/h
Highest directional split proportion (note-2)	805	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	50.1	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.995	
Two-way flow rate,(note-1) vp	1014	pc/h
Highest directional split proportion (note-2)	801	
Base percent time-spent-following, BPTSF	59.0	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	59.0	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.32	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
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Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	PM
Highway	SR 94
From/To	Lyons Valley Rd. to Jefferson
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1091 veh/h
Directional split 57 / 43 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.990	
Two-way flow rate,(note-1) vp	1198	pc/h
Highest directional split proportion (note-2)	683	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	48.7	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.995	
Two-way flow rate,(note-1) vp	1192	pc/h
Highest directional split proportion (note-2)	679	
Base percent time-spent-following, BPTSF	64.9	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	64.9	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.37	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	AM
Highway	SR 94
From/To	Jefferson Rd. to Melody Rd.
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 876 veh/h
Directional split 72 / 28 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.990	
Two-way flow rate,(note-1) vp	962	pc/h
Highest directional split proportion (note-2)	693	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	50.5	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.995	
Two-way flow rate,(note-1) vp	957	pc/h
Highest directional split proportion (note-2)	689	
Base percent time-spent-following, BPTSF	56.9	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	56.9	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.30	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	PM
Highway	SR 94
From/To	Jefferson Rd. to Melody Rd.
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 971 veh/h
Directional split 63 / 37 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.990	
Two-way flow rate,(note-1) vp	1066	pc/h
Highest directional split proportion (note-2)	672	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	49.7	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.995	
Two-way flow rate,(note-1) vp	1061	pc/h
Highest directional split proportion (note-2)	668	
Base percent time-spent-following, BPTSF	60.6	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	60.6	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.33	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	AM
Highway	SR 94
From/To	Jamacha Rd. to Steel Canyon Rd
Jurisdiction	San Diego County
Analysis Year	Existing + Proj + Cumulative
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 2236 veh/h
Directional split 61 / 39 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	2443	pc/h
Highest directional split proportion (note-2)	1490	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	39.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2430	pc/h
Highest directional split proportion (note-2)	1482	
Base percent time-spent-following, BPTSF	88.2	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	88.2	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.76	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	PM
Highway	SR 94
From/To	Jamacha Rd. to Steel Canyon Rd
Jurisdiction	San Diego County
Analysis Year	Existing + Proj + Cumulative
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 2503 veh/h
Directional split 51 / 49 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	2734	pc/h
Highest directional split proportion (note-2)	1394	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	36.8	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2721	pc/h
Highest directional split proportion (note-2)	1388	
Base percent time-spent-following, BPTSF	90.9	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	90.9	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.85	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	AM
Highway	SR 94
From/To	Steel Canyon Rd. to Lyons V. R
Jurisdiction	San Diego County
Analysis Year	Existing + Proj + Cumulative
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1770 veh/h
Directional split 72 / 28 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1934	pc/h
Highest directional split proportion (note-2)	1392	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	43.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1924	pc/h
Highest directional split proportion (note-2)	1385	
Base percent time-spent-following, BPTSF	81.6	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	81.6	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.60	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	PM
Highway	SR 94
From/To	Steel Canyon Rd to Lyons V. Rd
Jurisdiction	San Diego County
Analysis Year	Existing + Proj + Cumulative
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 2129 veh/h
Directional split 63 / 37 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	2326	pc/h
Highest directional split proportion (note-2)	1465	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	40.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2314	pc/h
Highest directional split proportion (note-2)	1458	
Base percent time-spent-following, BPTSF	86.9	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	86.9	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.73	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	AM
Highway	SR 94
From/To	Lyons Valley Rd. to Jefferson
Jurisdiction	San Diego County
Analysis Year	Existing + Project
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1449 veh/h
Directional split 79 / 21 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1583	pc/h
Highest directional split proportion (note-2)	1251	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	45.7	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1575	pc/h
Highest directional split proportion (note-2)	1244	
Base percent time-spent-following, BPTSF	75.0	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	75.0	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.49	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	PM
Highway	SR 94
From/To	Lyons Valley Rd. to Jefferson
Jurisdiction	San Diego County
Analysis Year	Existing + Proj + Cumulative
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1593 veh/h
Directional split 57 / 43 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1740	pc/h
Highest directional split proportion (note-2)	992	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	44.5	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1732	pc/h
Highest directional split proportion (note-2)	987	
Base percent time-spent-following, BPTSF	78.2	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	78.2	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.54	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:

1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	AM
Highway	SR 94
From/To	Jefferson Rd. to Melody Rd.
Jurisdiction	San Diego County
Analysis Year	Existing + Proj + Cumulative
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1206 veh/h
Directional split 72 / 28 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1317	pc/h
Highest directional split proportion (note-2)	948	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	47.8	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1311	pc/h
Highest directional split proportion (note-2)	944	
Base percent time-spent-following, BPTSF	68.4	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	68.4	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.41	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	NP
Agency/Co.	LLG
Date Performed	2/25/2005
Analysis Time Period	PM
Highway	SR 94
From/To	Jefferson Rd. to Melody Rd.
Jurisdiction	San Diego County
Analysis Year	Existing + Proj + Cumulative
Description	Peaceful Valley Ranch

Input Data

Highway class Class 1

Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	5	%
Segment length	0.0	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	8	/mi
Up/down		%			

Two-way hourly volume, V 1472 veh/h
Directional split 63 / 37 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.995	
Two-way flow rate,(note-1) vp	1608	pc/h
Highest directional split proportion (note-2)	1013	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.0	mi/h
Free-flow speed, FFS	58.0	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	45.5	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1600	pc/h
Highest directional split proportion (note-2)	1008	
Base percent time-spent-following, BPTSF	75.5	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	75.5	%

Level of Service and Other Performance Measures

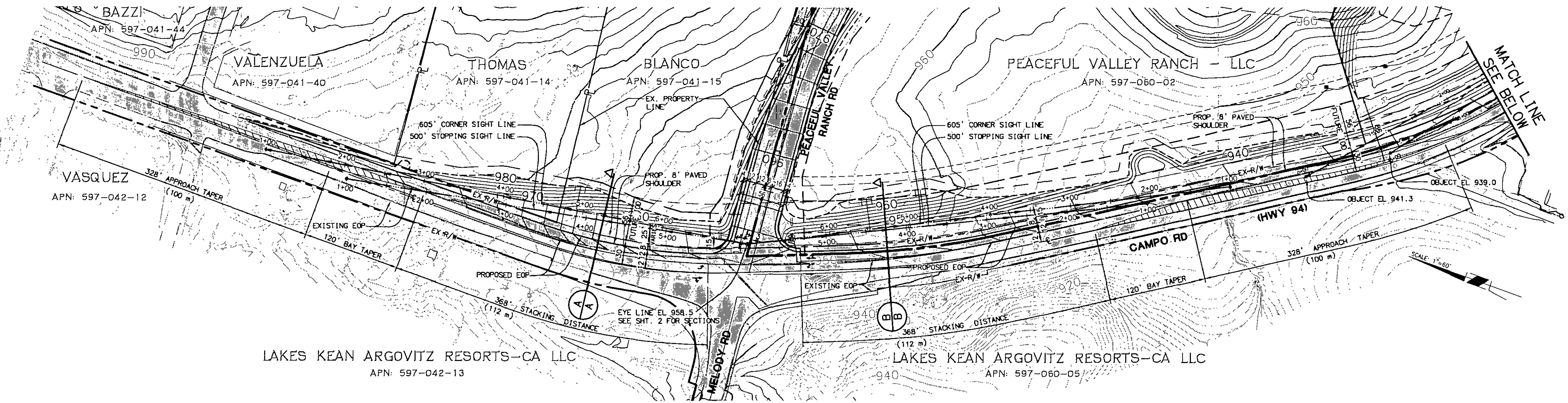
Level of service, LOS	D	
Volume to capacity ratio, v/c	0.50	
Peak 15-min vehicle-miles of travel, VMT15	0	veh-mi
Peak-hour vehicle-miles of travel, VMT60	0	veh-mi
Peak 15-min total travel time, TT15	0.0	veh-h

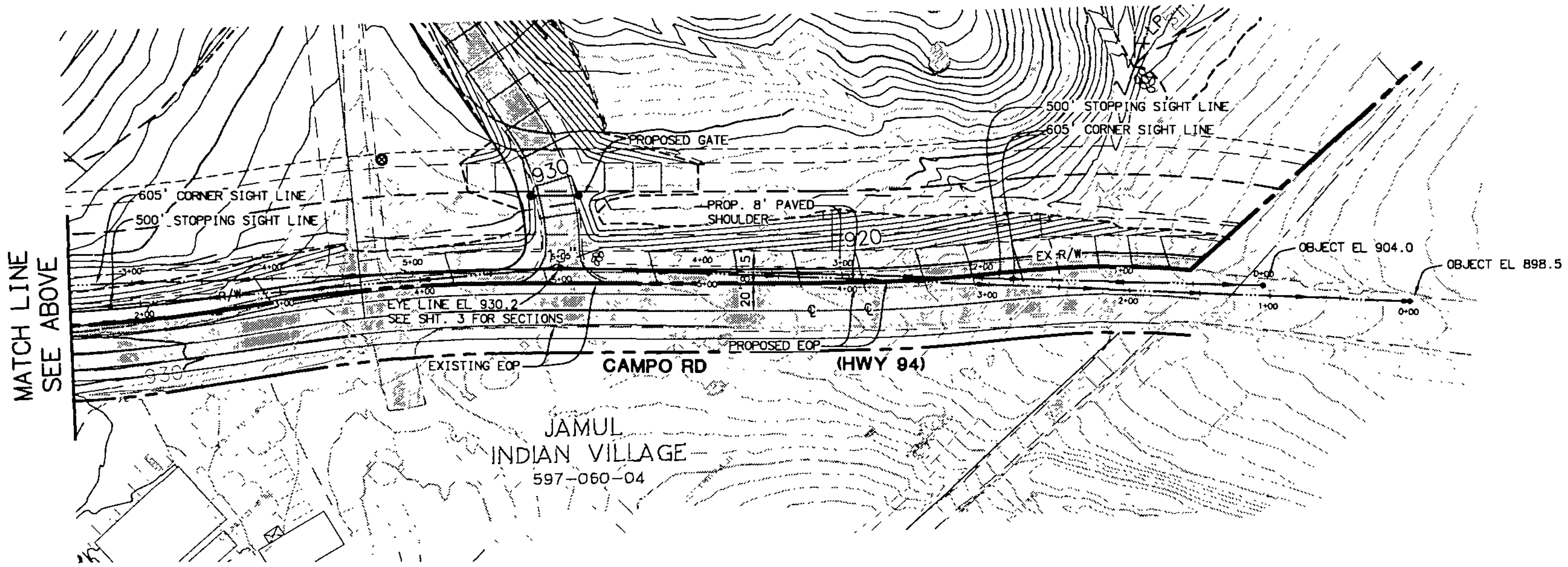
Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

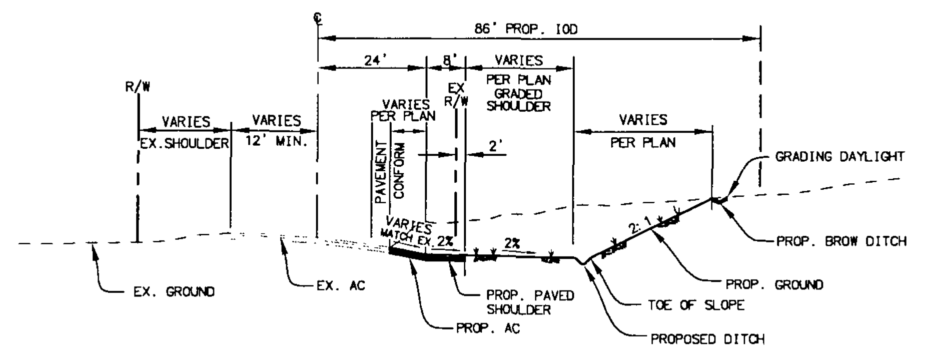
APPENDIX H

SIGHT DISTANCE AND CONCEPTUAL STRIPING PLAN

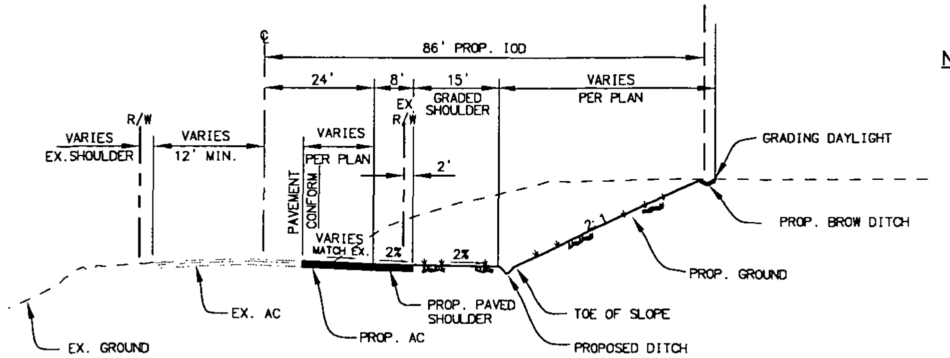
SIGHT DISTANCE STUDY/CONCEPTUAL STRIPING PLAN
PEACEFUL VALLEY RANCH







SECTION A-A
SCALE: NTS



SECTION B-B
SCALE: NTS

NOTES:

1) MINIMUM STOPPING SIGHT DISTANCE PROVIDED IS 500 FEET AT 55 MPH, BASED UPON CALTRANS HIGHWAY DESIGN MANUAL, SECTION 201.3-STOPPING SIGHT DISTANCE.

   MINIMUM CORNER SIGHT DISTANCE PROVIDED IS 605 FEET AT 55 MPH, BASED UPON CALTRANS HIGHWAY DESIGN MANUAL, SECTION 405.1 (2)(a)-CORNER SIGHT DISTANCE.

2) PROPOSED PROJECT IMPROVEMENTS SHALL CONSIST OF THE FOLLOWING:

-A LEFT HAND TURN LANE ALONG WESTBOUND SR-94 AT THE MELODY ROAD/SR-94 INTERSECTION

-A LEFT HAND TURN LAND ALONG EASTBOUND SR-94 AT THE PROPOSED PEACEFUL VALLEY RANCH ROAD/SR-94 INTERSECTION

-AN 8' PAVED SHOULDER AND 15' (MINIMUM) GRADED SHOULDER ALONG THE PROJECT FRONTAGE (SEE SECTION A-A AND SECTION B-B).

SCALE 1"=60'

60 0 60 120 180
GRAPHIC SCALE

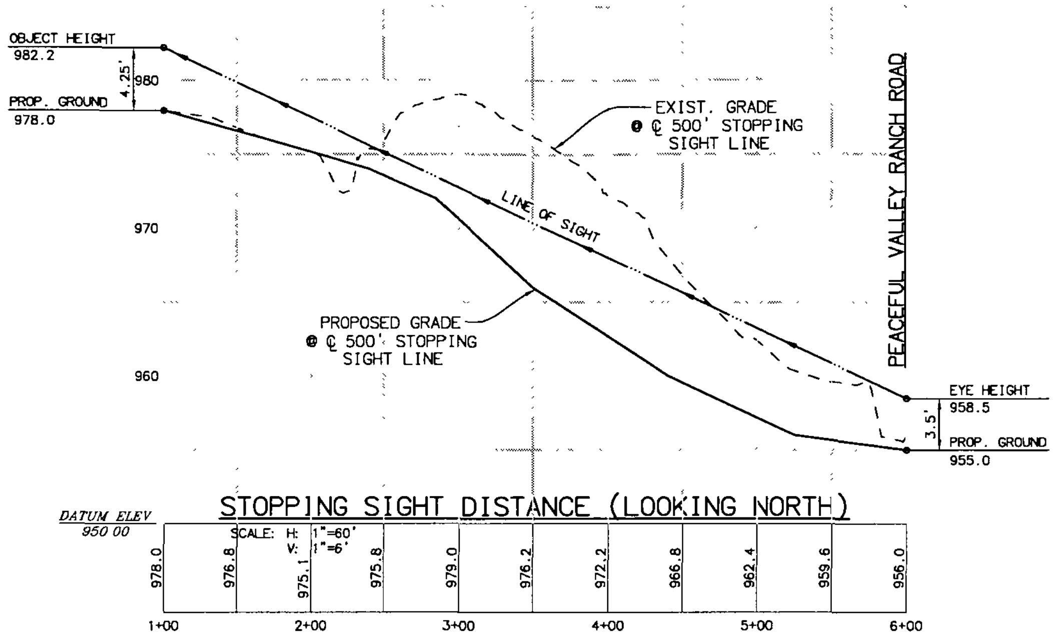
SHEET 1 OF 3

RBF CONSULTING
PLANNING ■ DESIGN ■ CONSTRUCTION

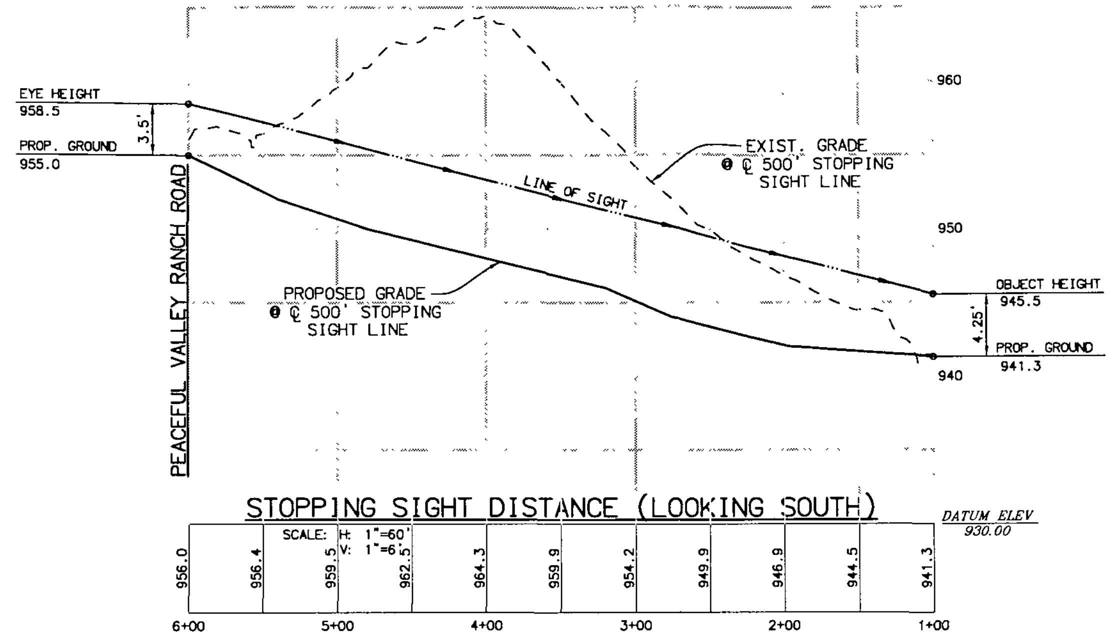
SIGHT VISIBILITY AND FRONTAGE IMPROVEMENT STUDY

CAMPO ROAD AND PEACEFUL VALLEY RANCH ROAD

SECTIONS



STOPPING SIGHT DISTANCE (LOOKING NORTH)



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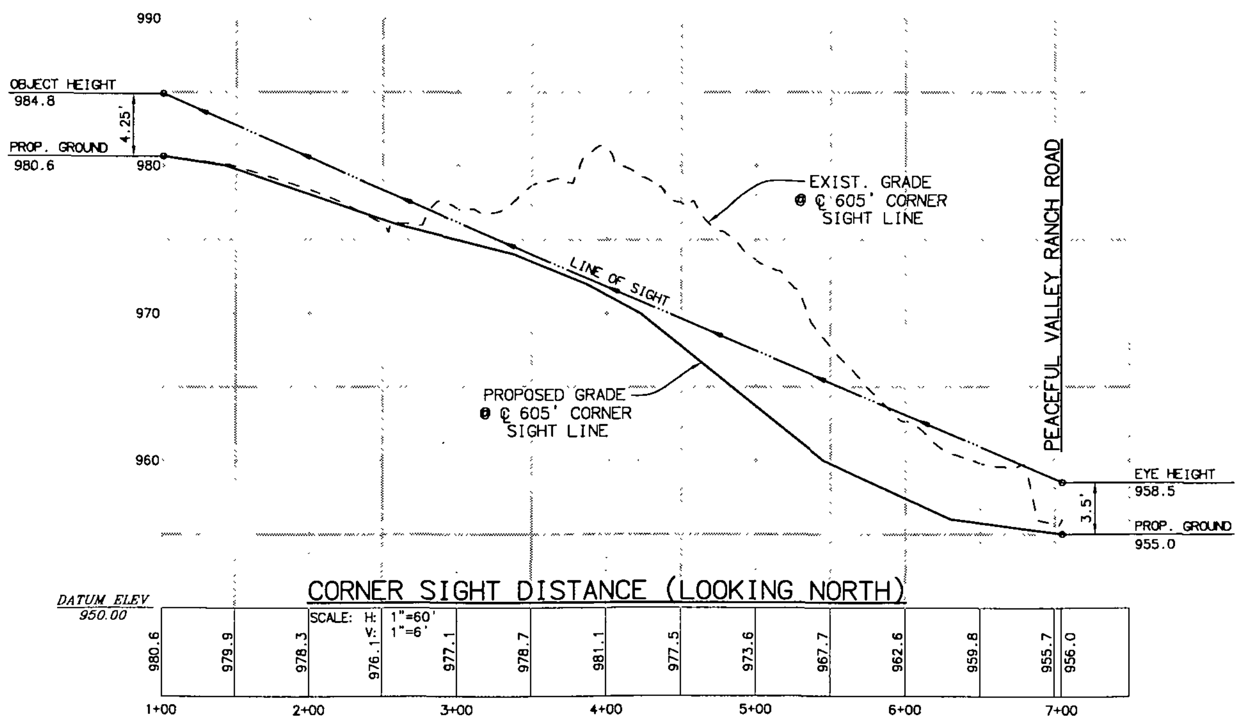
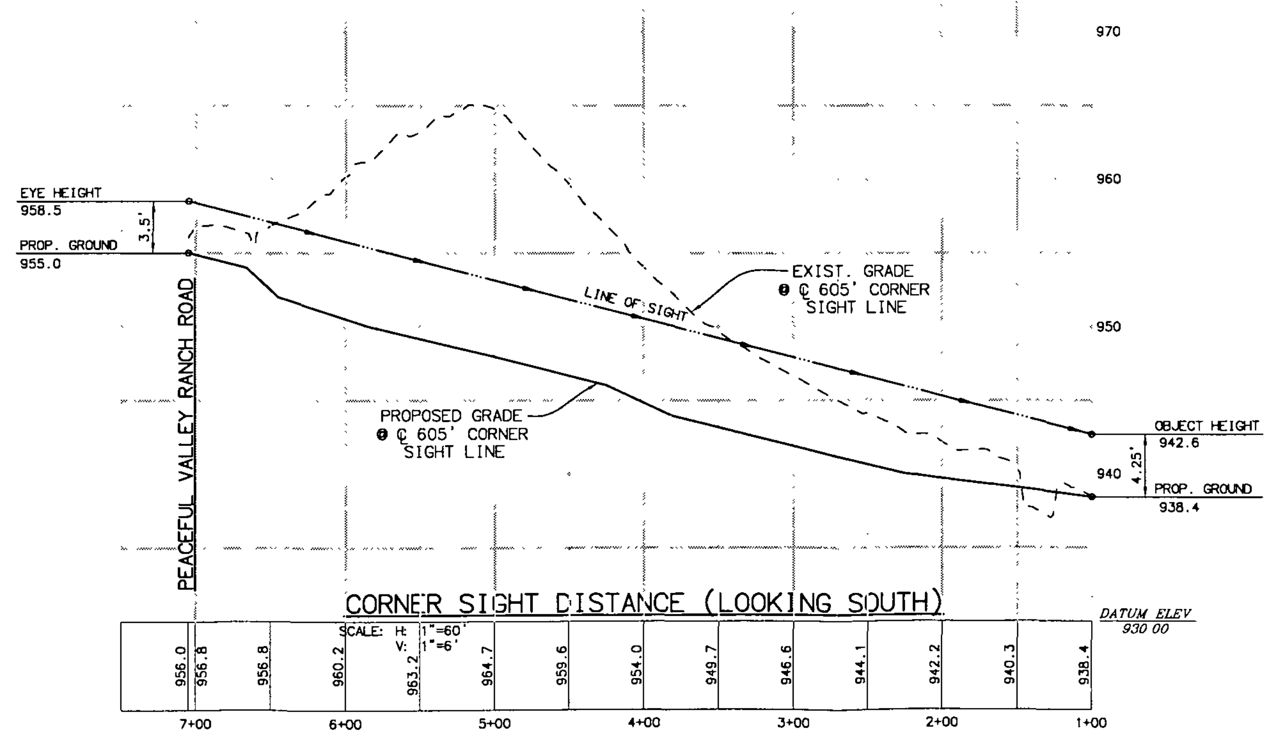


CORNER SIGHT DISTANCE (LOOKING NORTH)



CORNER SIGHT DISTANCE (LOOKING SOUTH)

SHEET 2 OF 3

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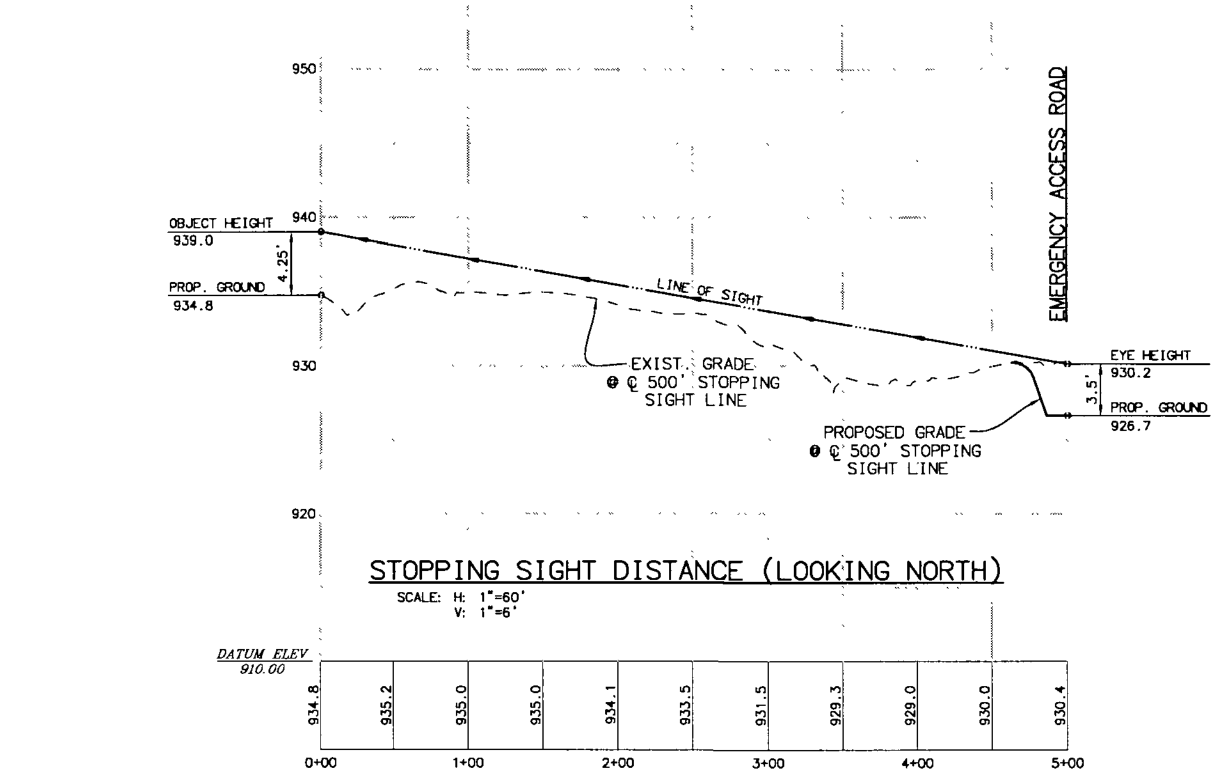
9755 CLAIREMONT MESA BOULEVARD SUITE 100
SAN DIEGO CALIFORNIA 92124-1324
858.614.5000 • FAX 858.614.5001 • www.RBF.com

H:\PDATA\25100796\CADD\Planning\Exhibit\796EX026.dwg 04/26/07 - 4:06pm XBUTS

SIGHT VISIBILITY AND FRONTAGE IMPROVEMENT STUDY

CAMPO ROAD AND EMERGENCY ACCESS ROAD

SECTIONS



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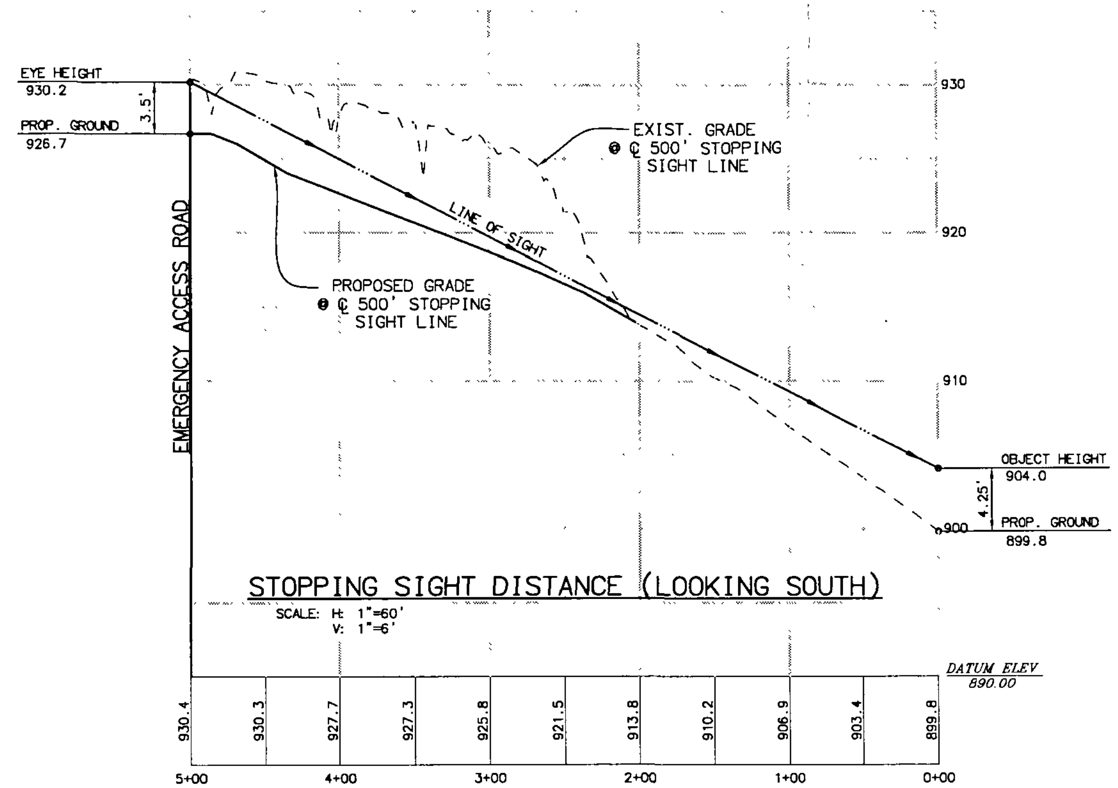
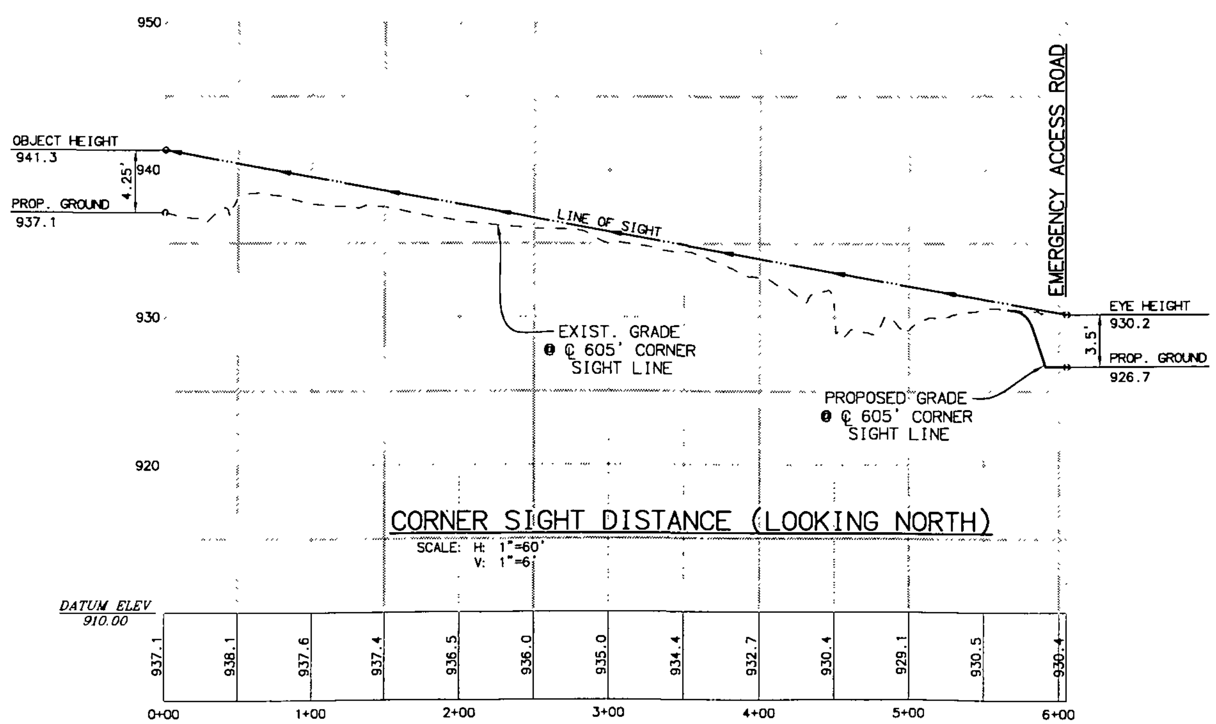
SCALE: H: 1"=60' V: 1"=6'



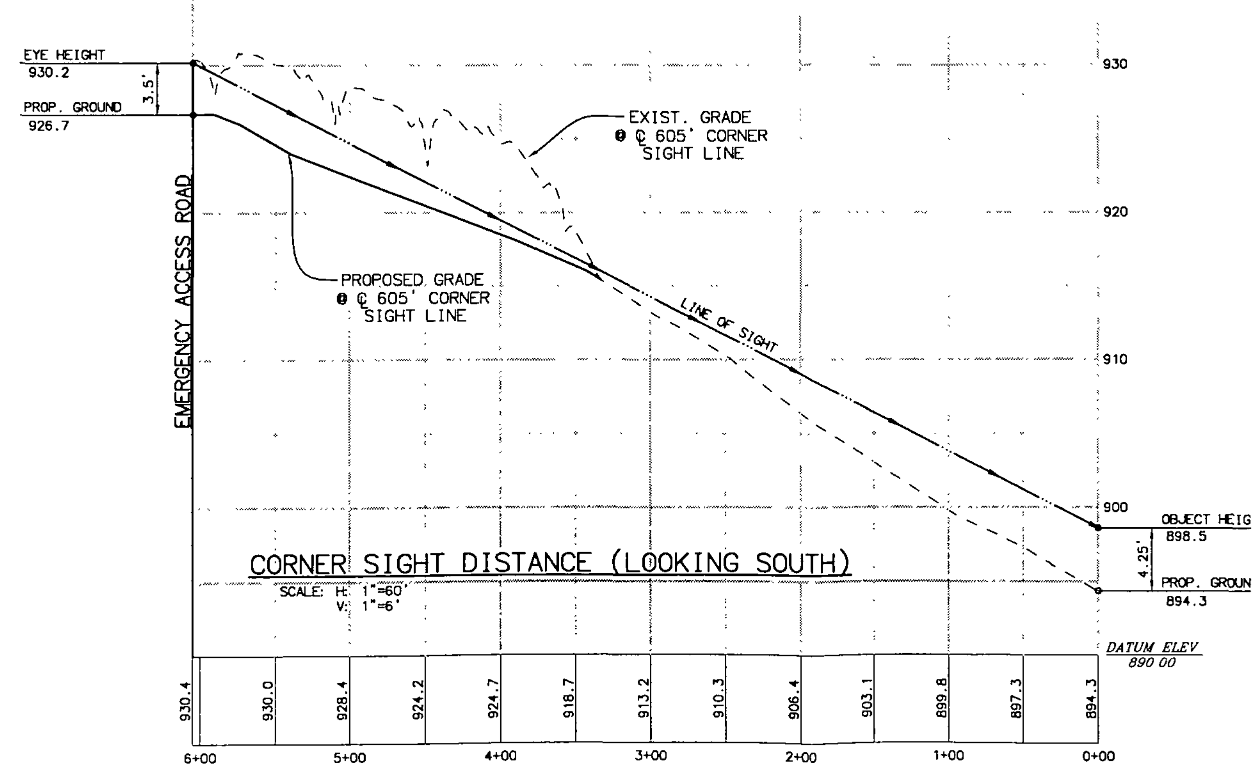
STOPPING SIGHT DISTANCE (LOOKING SOUTH)

SCALE: H: 1"=60' V: 1"=6'



CORNER SIGHT DISTANCE (LOOKING NORTH)

SCALE: H: 1"=60' V: 1"=6'



CORNER SIGHT DISTANCE (LOOKING SOUTH)

SCALE: H: 1"=60' V: 1"=6'

SHEET 3 OF 3

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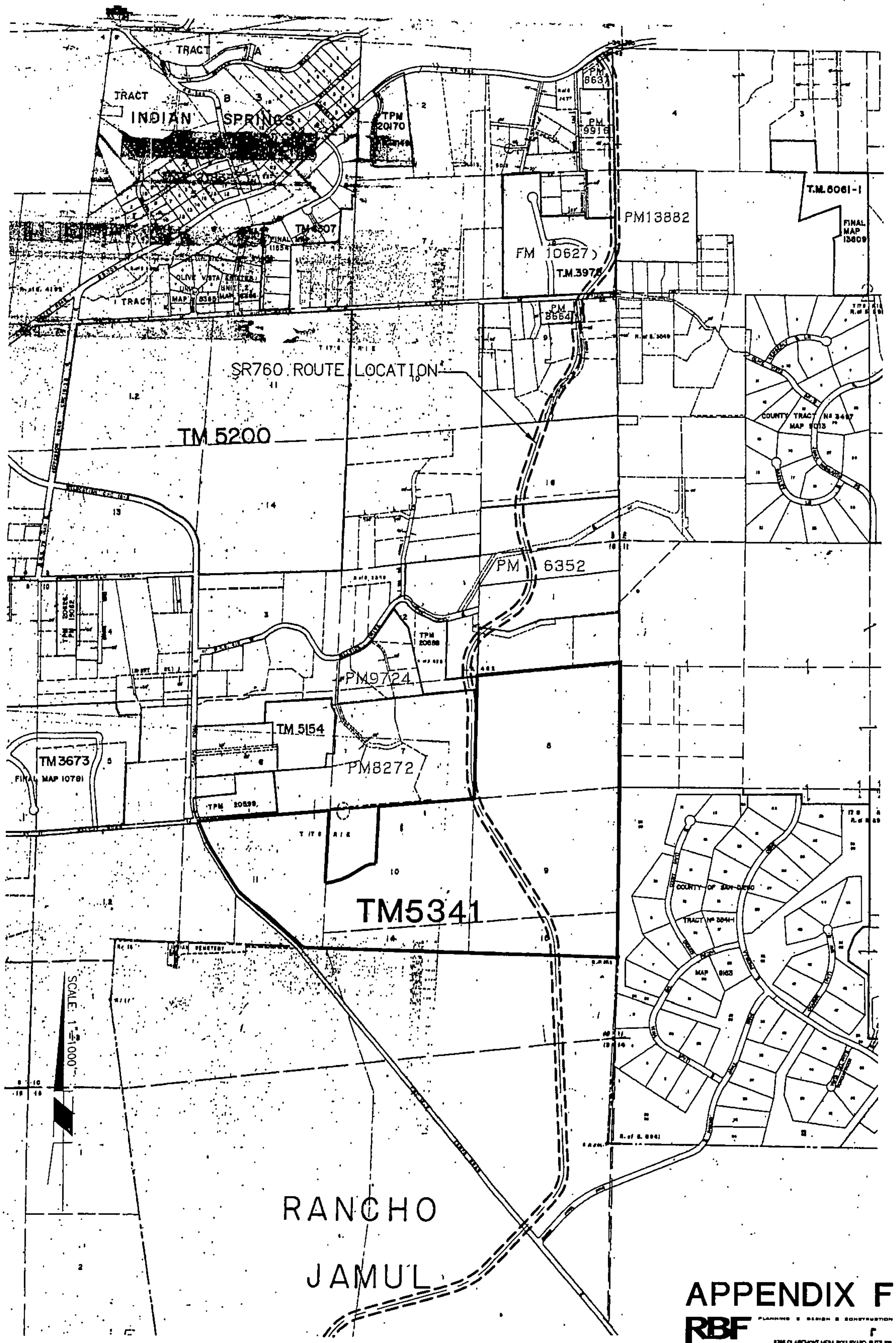
APPENDIX I

REGIONAL CORRIDOR MAP

PEACEFUL VALLEY RANCH
SC 760 ALIGNMENT



APPENDIX F

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APPENDIX J

TRAFFIC SIGNAL WARRANTS WORKSHEETS

Table 4C-101. Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN.............. RURAL.....X.....	Minimum Requirements EADT			
1A - Minimum Vehicular Traffic Satisfied ______ Not Satisfied __X__	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Number of lanes for moving traffic on each approach ~~Major Street~~ Minor Street	Urban	Rural	Urban	Rural
1.....8500..... 1.....240.....	8,000	5,600	2,400	1,680
~~2 or More~~ ~~1~~	9,600	~~6,720~~	2,400	~~1,680~~
2 or More..... 2 or More.....	9,600	6,720	3,200	2,240
1..... 2 or More.....	8,000	5,600	3,200	2,240
1B - Interruption of Continuos Traffic Satisfied ______ Not Satisfied ______	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Number of lanes for moving traffic on each approach ~~Major Street~~ ~~Minor Street~~	Urban	Rural	Urban	Rural
1.....8500..... 1.....240.....	12,000	8,400	1,200	850
~~2 or More~~ 1.....	14,400	~~10,080~~	1,200	~~850~~
2 or More..... 2 or More.....	14,400	10,080	1,600	1,120
1..... 2 or More.....	12,000	8,400	1,600	1,120
1A&B - Combinations Satisfied ______ Not Satisfied ______ No one warrant satisfied, but following warrants fulfilled 80% or more..... ______ (1) ______ (2)	2 Warrants		2 Warrants	

Note: To be used only for **NEW INTERSECTIONS** or other locations where it is not reasonable to count actual traffic volumes.

NOT SATISFIED

EXISTING
SR 94/Melody Rd Intersection

May 20, 2004

NOTE: Latest 2004 CalTrans Count on SR 94 utilized (8500 ADT)

Table 4C-101. Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN.................. RURAL.........X....	Minimum Requirements EADT			
1A - Minimum Vehicular Traffic Satisfied ______ Not Satisfied __X__	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Number of lanes for moving traffic on each approach Major Street / Minor Street	Urban	Rural	Urban	Rural
1.........8875 / 1.........375	8,000	5,600	2,400	1,680
~~2 or More........ / 1........~~	9,600	~~6,720~~	2,400	~~1,680~~
2 or More........ / 2 or More........	9,600	6,720	3,200	2,240
1........ / 2 or More........	8,000	5,600	3,200	2,240
1B - Interruption of Continuos Traffic Satisfied ______ Not Satisfied __X__	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Number of lanes for moving traffic on each approach Major Street / Minor Street	Urban	Rural	Urban	Rural
1.........8875 / 1.........375	12,000	8,400	1,200	850
~~2 or More........ / 1........~~	14,400	~~10,080~~	1,200	~~850~~
2 or More........ / 2 or More........	14,400	10,080	1,600	1,120
1........ / 2 or More........	12,000	8,400	1,600	1,120
1A&B - Combinations Satisfied ______ Not Satisfied ______ No one warrant satisfied, but following warrants fulfilled 80% or more.......... ____ 1 ____ 2	2 Warrants		2 Warrants	

Note: To be used only for **NEW INTERSECTIONS** or other locations where it is not reasonable to count actual traffic volumes.

NOT SATISFIED

EXISTING + PEACEFUL VALLEY RANCH PROJECT

SR 94 / MELODY RD / PEACEFUL VALLEY RANCH RD INTERSECTION

May 20, 2004

Table 4C-101. Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

	Minimum Requirements EADT			
URBAN.............................. RURAL..........X..............				
1A - Minimum Vehicular Traffic Satisfied X Not Satisfied ____	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Number of lanes for moving traffic on each approach				
Major Street / Minor Street	Urban	Rural	Urban	Rural
1.......17,400 / 1.......2340	8,000	5,600	2,400	1,680
2 or More.............. / 1..............	9,600	6,720	2,400	1,680
2 or More.............. / 2 or More..............	9,600	6,720	3,200	2,240
1.............. / 2 or More..............	8,000	5,600	3,200	2,240
1B - Interruption of Continuos Traffic Satisfied X Not Satisfied ____	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Number of lanes for moving traffic on each approach				
Major Street / Minor Street	Urban	Rural	Urban	Rural
1.......17,400 / 1.......2340	12,000	8,400	1,200	850
2 or More.............. / 1..............	14,400	10,080	1,200	850
2 or More.............. / 2 or More..............	14,400	10,080	1,600	1,120
1.............. / 2 or More..............	12,000	8,400	1,600	1,120
1A&B - Combinations Satisfied ____ Not Satisfied ____ No one warrant satisfied, but following warrants fulfilled 80% or more........... ____ 1 ____ 2	2 Warrants		2 Warrants	

Note: To be used only for **NEW INTERSECTIONS** or other locations where it is not reasonable to count actual traffic volumes.

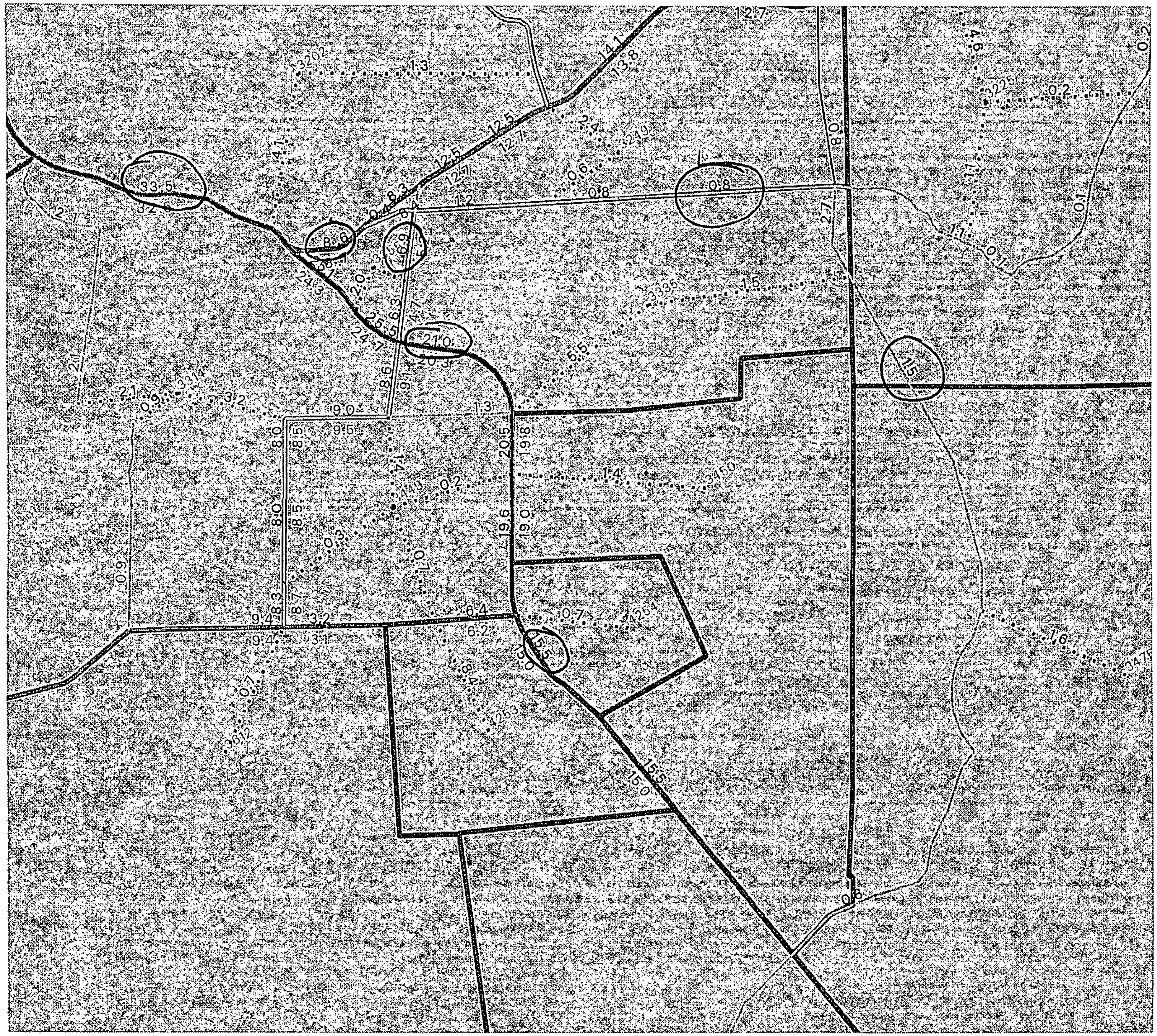
EXISTING + PVR + Cumulative Projects
(Including CASINO)

SR 94 / CASINO ENTRANCE / PEACEFUL
VALLEY RANCH RD INTERSECTION

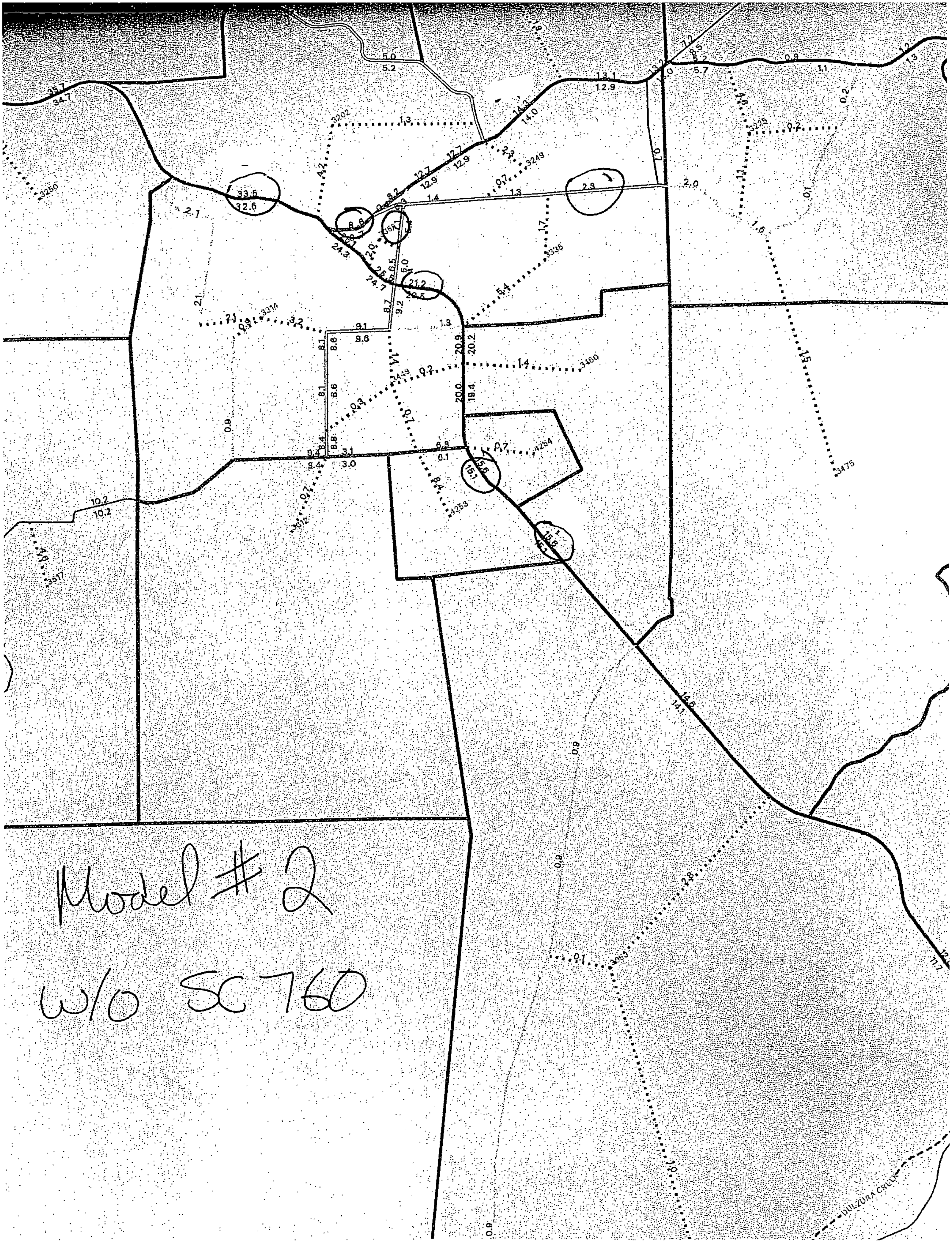
APPENDIX K

YEAR 2030 TRAFFIC MODEL FORECAST

Model #1

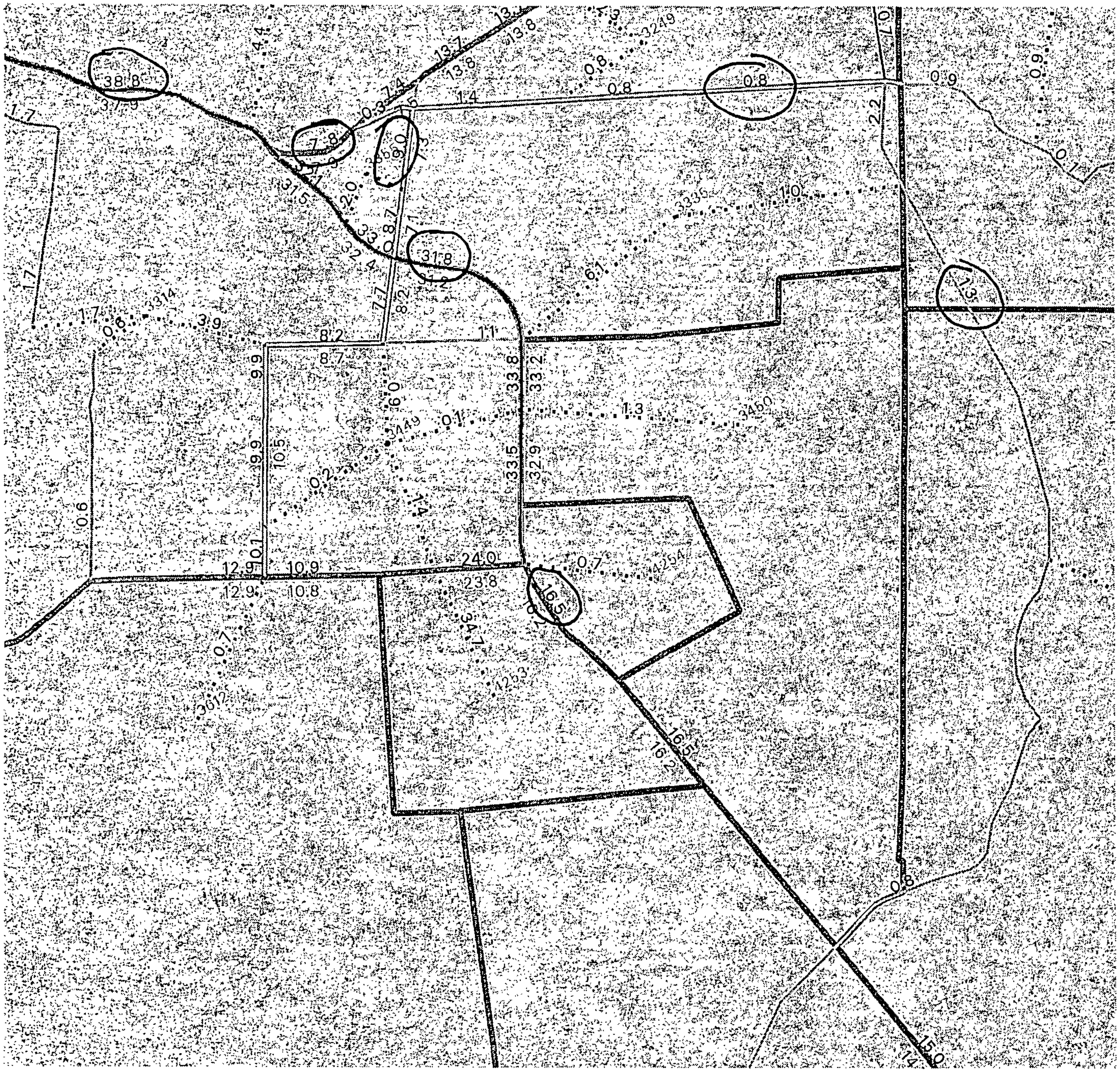


12.7
1.3
14.1
13.8
12.5
12.7
0.8
8.0
2.7
33.5
8.6
6.9
21.0
20.3
1.5
5.5
15
9.0
9.5
1.3
20.5
19.8
1.4
0.2
19.6
19.0
0.7
6.4
6.2
15.5
15.0
9.4
3.2
3.1
8.3
8.7
8.5
7.6

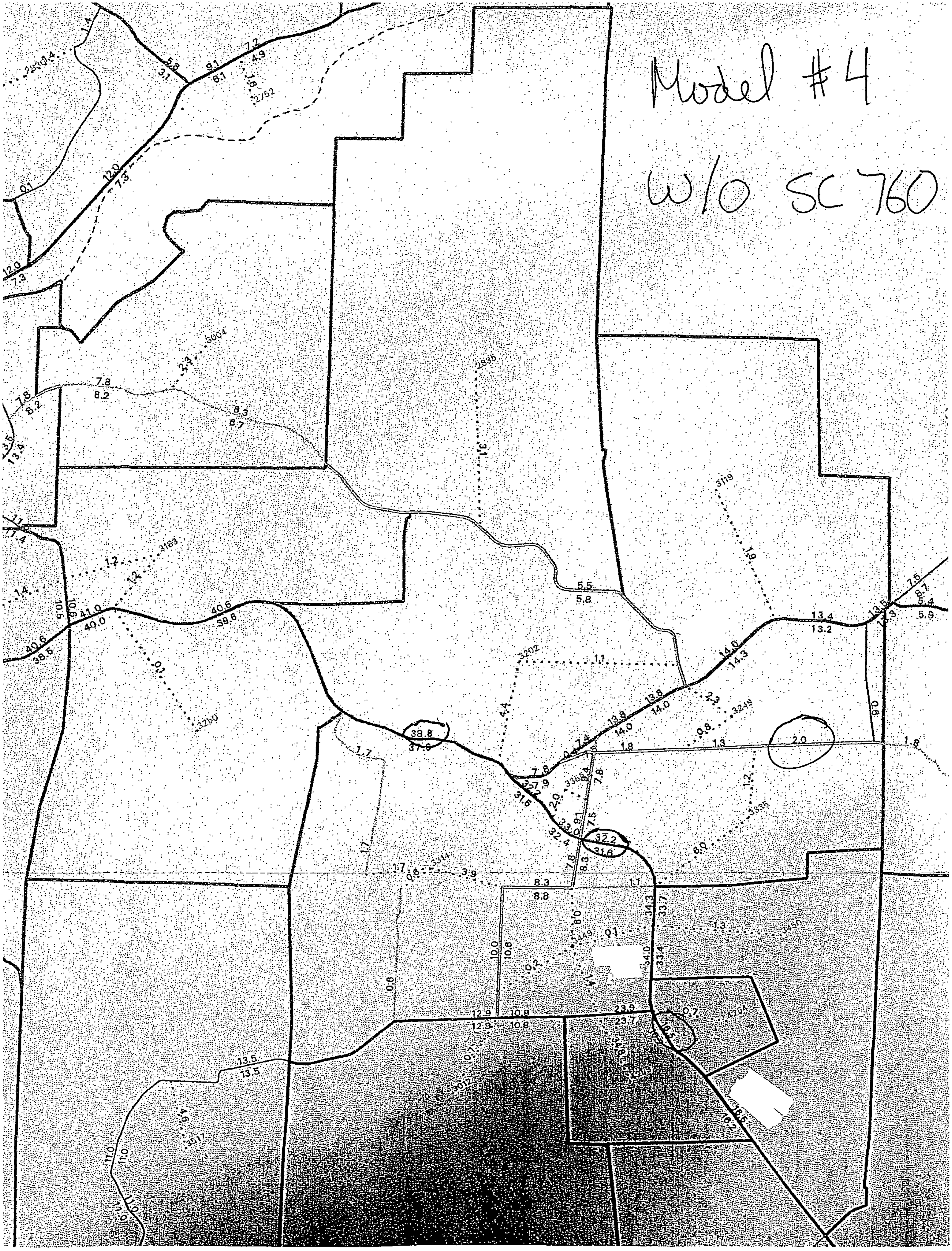


Model #2
w/o SC760

Model #3



Model #4
w/o SC 760

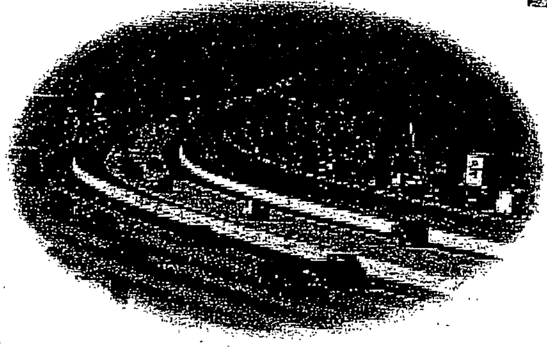


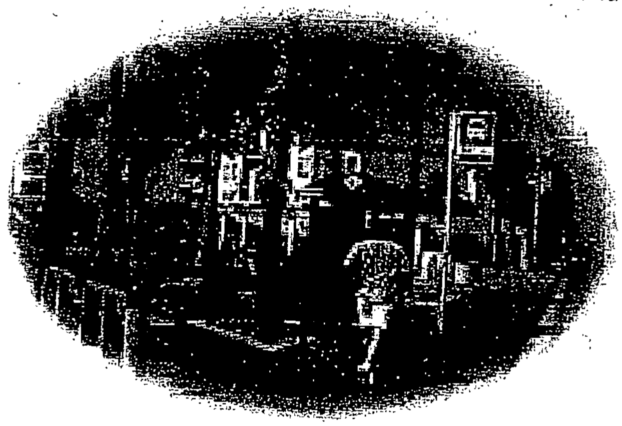
APPENDIX L

SR 94 PROPOSED IMPROVEMENTS DOCUMENTATION

MOBILITY 2030

The Transportation Plan for the San Diego Region





SANDAG

Final

April 2003

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FREEWAY	FROM	TO	EXISTING	IMPROVEMENTS	BASELINE	REVENUE CONSTRAINED	MOBILITY	HIGHWAY EMPHASIS	HOV EMPHASIS	TRANSIT EMPHASIS	UNCONSTRAINED
SR 56	I-5	I-15	4F	8F				X			
SR 67	I-8	SR 52	6F	8F				X			
SR 67	SR 52	Mapleview St	4F	6F				X			
SR 67	Mapleview St	Dye Rd	2C	4C				X	X		
SR 67	Scripps Poway Pkwy	Dye Rd	2C	4C + 2TO						X	
SR 75/SR 282	Glorietta Blvd	Alameda Blvd	6C	6C + 2TU		X	X	X			X
SR 76	I-5	Melrose Dr	4E	6E							X
SR 76	Melrose Dr	I-15	2C	4C			X				
SR 76	Melrose Dr	I-15	2C	6C							X
SR 76	I-15	Valley Center Rd	2C	4C				X			
SR 78	I-5	I-15	6F	8F			X	X			
SR 78	I-5	I-15	6F	8F + 2HOV					X		X
SR 94	I-5	I-805	8F	8F + 2HOV		X	X				X
SR 94	I-5	I-805	8F	8F + 2TO						X	
SR 94	I-5	I-805	8F	10F				X			
SR 94	I-805	SR 125	8F	8F + 2HOV			X		X		X
SR 94	I-805	SR 125	8F	8F + 2TO						X	
SR 94	I-805	SR 125	8F	10F			X				
SR 94	SR 125	Avocado Blvd	4F	6F			X				
SR 94	SR 125	Avocado Blvd	4F	6F + 2HOV					X		X
SR 94	SR 125	Avocado Blvd	4F	6F + 2TO						X	
SR 94	Avocado Blvd	Jamacha Rd	4C	4F			X				X
SR 94	Avocado Blvd	Miller Ranch Rd	4C/2C	6C/4C				X			
SR 94	Jamacha Rd	Steele Cyn Rd	2C	4C			X				X

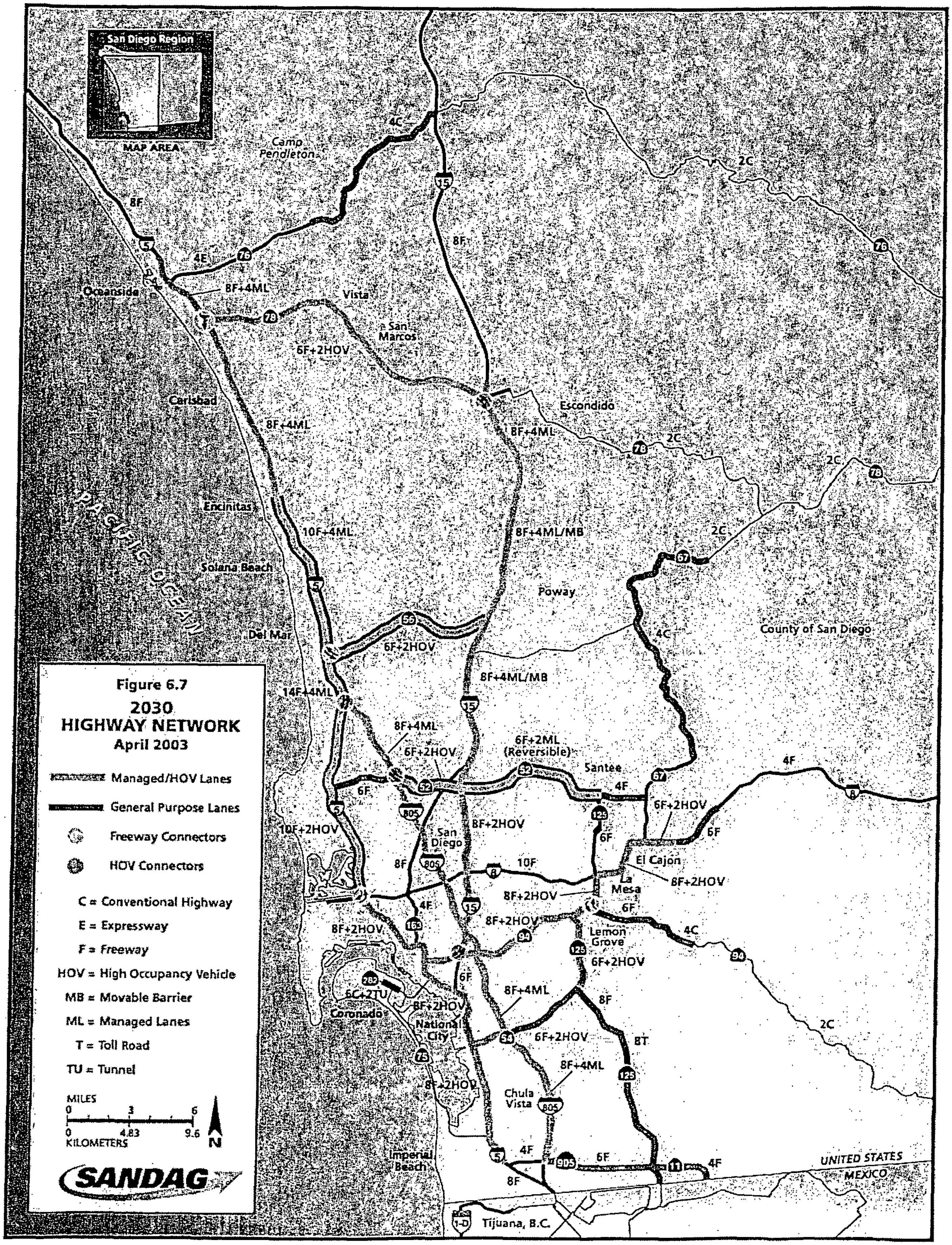
Figure 6.7
2030
HIGHWAY NETWORK
April 2003
Managed/HOV Lanes
General Purpose Lanes
Freeway Connectors
HOV Connectors
C = Conventional Highway
E = Expressway
F = Freeway
HOV = High Occupancy Vehicle
MB = Movable Barrier
ML = Managed Lanes
T = Toll Road
TU = Tunnel
MILES
0 3 6
0 4.83 9.6
KILOMETERS
N
SANDAG
San Diego Region
MAP AREA
Camp Pendleton
Oceanside
Vista
San Marcos
Carlsbad
Escondido
Encinitas
Solana Beach
Del Mar
Poway
Santee
County of San Diego
San Diego
El Cajon
La Mesa
Lemon Grove
Coronado
National City
Chula Vista
Imperial Beach
PACIFIC OCEAN
UNITED STATES
MEXICO
Tijuana, B.C.
8F
4E
4C
2C
8F+4ML
6F+2HOV
8F+4ML/MB
10F+4ML
14F+4ML
6F+2ML (Reversible)
8F+2HOV
10F+2HOV
6C+2TU
8T
4F
6F
10F

RURAL HIGHWAY 94
CORRIDOR STUDY

JANUARY 2001

San Diego

ASSOCIATION OF
GOVERNMENTS

401 B Street, Suite 800
San Diego, CA 92101
(619) 595-5300

Elisa Arias

RURAL HIGHWAY 94
CORRIDOR STUDY

JANUARY 2001

San Diego
ASSOCIATION OF GOVERNMENTS

401 B Street, Suite 800
San Diego, CA 92101
(619) 595-5300

Elisa Arias

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As of February 24, 2003

ABSTRACT

TITLE:	Rural Highway 94 Corridor Study
AUTHOR:	San Diego Association of Governments
DATE:	January 2001
SOURCE OF COPIES:	San Diego Association of Governments 401 B Street, Suite 800 San Diego, CA 92101 (619) 595-5300
NUMBER OF PAGES:	83
ABSTRACT:	This study evaluated several transportation alternatives to accommodate future traffic flows on the rural Highway 94 corridor and recommended a strategy that combines improvements for roads, ports of entry, and rail cargo service.

ACKNOWLEDGMENTS

The Rural Highway 94 Corridor Study was prepared with the guidance and assistance of a Policy Advisory Committee and a Technical/Citizens Advisory Committee.

Members of the Policy Advisory Committee:

Hon. Dianne Jacob, County of San Diego, Chair
Carl West, Caltrans
Hon. Richard Ramos, City of El Cajon
Hon. Art Madrid, City of La Mesa
Hon. Mary England, City of Lemon Grove
Hon. Jack Dale, City of Santee
Hon. Barbara Warden, City of San Diego
Hon. Mitch Beauchamp, Metropolitan Transit Development Board
Elsa Saxod, SANDAG's Committee on Binational Regional Opportunities
Carole Butler, U.S. Consulate in Tijuana
Héctor Vanegas, Consulate General Office of Mexico in San Diego
Dennis Turner, Southern California Tribal Chairman's Association

Agencies and Organizations of the Technical Advisory Committee:

Aduana de Tecate, Baja California (Customs Administration)
Air Pollution Control District
Autopista Tijuana-Mexicali, SA de CV (Tijuana-Tecate Toll Road Concessionaire)
Ayuntamiento de Tecate (Municipality of Tecate, Baja California)
Backcountry Coalition
Boulevard Sponsor Group
CABIN, Mexico (Commission of Federal Property Appraisal)
California Department of Fish & Game
California Highway Patrol
California Trucking Association
Caltrans, District 11
CANACAR, Mexico (Trucking Association)
Citizens Alliance for Individual Rights
City of El Cajon
City of La Mesa
City of Lemon Grove
City of San Diego
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Committee for Responsible Growth
Consejo de Desarrollo Económico de Tecate (Economic Development Council)
County of San Diego

Endangered Habitats League
Federal Highway Administration
Federal Transit Administration
Highway 94 Club
IMPLAN Tijuana (Municipal Planning Institute)
Jacumba Sponsor Group
Jamul-Dulzura Planning Group
Jamul–Dulzura Union School District
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San Diego Rural Fire Protection District
Save the Back Country
Southern California Tribal Chairman's Association
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Tecate Regional Economic Development Commission
Tecate Sponsor Group
U. S. Border Patrol - Campo Station
U. S. Customs Service
U. S. Environmental Protection Agency
U. S. General Services Administration
U. S. Fish & Wildlife

SANDAG wishes to acknowledge the contribution of the following individuals from Caltrans, District 11, in the preparation of this study:

José A. Nuncio, Robert Hoglen, and Pat Landrum, Advanced Planning
Chad Lambirth, GIS Modeling
Debra Stout, System Planning

The following staff of the San Diego Association of Governments contributed to the preparation of this report:

Elisa Arias, Project Manager
Bob Parrott, Interim Executive Director
Eric Pahlke, Director of Transportation
Lee Hultgren, Director of Transportation (Retired)
Anne Steinberger, Publications Writer
Mike Calandra, Senior Research Analyst
Ziying Ouyang, Senior Research Technician

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

RECOMMENDATIONS

RECOMMENDATIONS

INTRODUCTION

In July 1998, SANDAG initiated the Rural Highway 94 Corridor Study. Policy and Technical/Citizens Advisory Committees have provided input to SANDAG at several meetings held since that time. In September 2000, the SANDAG Board of Directors approved the recommendations proposed by the study Committees. These recommendations, which are described below, have been transmitted to Caltrans, District 11, and to the County of San Diego.

RECOMMENDATIONS

A strategy that combines improvements for roads, ports of entry, and rail cargo service is likely to achieve the objective of accommodating future traffic on the Highway 94 corridor while trying to minimize the financial burden to the San Diego region and the potential environmental impacts associated with major improvements in this sensitive corridor.

Population growth in the Jamul/Dulzura and Mountain Empire areas will directly affect traffic growth on the Highway 94 corridor. The County of San Diego currently is updating its General Plan. In 1998, the Board of Supervisors adopted 2020 population figures for the unincorporated communities. However, alternatives are still under consideration and the population forecasts that ultimately are incorporated in the County of San Diego General Plan should be used in future traffic forecasts.

Over time, several actions will be necessary to provide an adequate level of service for drivers on Highway 94. Figure 1, on page 6, illustrates the recommended actions, which are described below:

- **Highway Improvements**

  The Policy Advisory Committee recommended Caltrans revise planning documents, such as the Highway 94 Transportation Concept Report, to reflect Highway 94 as a two-lane conventional highway between Steele Canyon Road and its junction with Ribbonwood Road/Interstate 8 near the community of Boulevard.

  The Policy Advisory Committee also recommended the widening of Highway 94 to four lanes from the Jamacha junction (junction of State Routes 94 and 54) to Steele Canyon Road as a near-term project. Projects such as the recently opened Steele Canyon High School are expected to increase traffic on that section of the Highway 94 corridor.

The SANDAG 2020 Regional Transportation Plan (RTP) includes the construction of Highway 94 as a four-lane freeway on a new alignment between Avocado Boulevard and Millar Ranch Road. No funding has been identified for this project at this time. Given the recommended widening to four lanes between the Jamacha junction and Steele Canyon Road, this long-range project will have to be re-evaluated to assess whether or not it is needed.

In addition, non-capacity increasing operational improvements such as passing lanes, turnouts, and curve realignments also will be needed to provide better operating and safer conditions in the corridor. Caltrans' Truck Restriction Study has identified locations where curve realignments would be needed west of Route 188. Additional curve improvements may be identified when Caltrans completes the study for the segment of Highway 94 east of Route 188.

Other regional and binational projects also will help relieve traffic on the Highway 94 corridor by providing alternative routes or transportation modes for both passenger vehicles and trucks. These projects include:

- **Border Crossing Improvements**

  San Diego-Tijuana: Additional vehicular capacity at the Otay Mesa and future East Otay Mesa border crossings would reduce wait times in the San Diego-Tijuana international border. In turn, those two ports could attract more cargo and passenger vehicle traffic currently moving between Tecate, Baja California, and the San Diego area and points north.

  Expanding the hours of operation at the existing Otay Mesa port of entry would allow more vehicles to cross the border at this location and could attract vehicles from the Tecate to the San Diego-Tijuana ports of entry. In 1999, federal agencies initiated a four-month pilot project to extend cargo inspection and processing at the Otay Mesa port of entry from 5:00 to 8:00 p.m. Also, planning is underway on both sides of the border for the opening of a new port of entry at East Otay Mesa by 2010.

  In conjunction with expanded cross-border capacity at the San Diego-Tijuana border, reduction or elimination of tolls in the Tijuana-Tecate toll road would provide an incentive to increase the use of the toll highway as an alternative to Highway 94. This would probably require a Mexican government subsidy since a private firm holds the long-term concession of the Tijuana-Tecate toll road.

  Tecate: The upgrades approved at the Tecate, California port of entry will improve the inspection facilities but will not increase the vehicular capacity at the port. The proposed enhancements to the facilities in Tecate, Baja California would improve the traffic circulation within the City of Tecate by rerouting trucks to inspection yards located to the east of the downtown area.

  Jacumba-Jacumé: This potential border crossing would improve access for passenger vehicles and trucks that travel between Baja California and locations east of San Diego. Future traffic volumes across the Jacumba-Jacumé port of entry will depend in part upon the level of cross-border traffic the Tecate port of entry is able to accommodate. Traffic projections for 2020 suggest that approximately 4,100 vehicles would use the Jacumba-Jacumé crossing if Tecate maintains the current level of traffic in the future.

To allow for the future development of the Jacumba-Jacumé border crossing, it will be necessary for government agencies in California and Baja California to continue planning and coordination efforts to identify and reserve right-of-way for inspection facilities and connecting roadways.

- **San Diego and Arizona Eastern (SD&AE) Railway Reopening**

  Restoring the Desert Line section of the SD&AE railroad would provide a freight link to the entire United States and Mexico through its connection to the Union Pacific Railroad at Plaster City, California. The SD&AE Railway would reduce truck traffic on the Highway 94 corridor by diverting to rail some cargo currently transported by truck across the Tecate port of entry.

  The ownership of the 44-mile section of the line that runs between Tijuana and Tecate, Mexico has been transferred to the State of Baja California. The San Diego and Imperial Valley Railroad currently provides freight service between San Diego and Tecate only.

- **Monitoring Efforts**

  In preparation for the next Regional Transportation Plan update, it is recommended that SANDAG and Caltrans continue monitoring the following:

  - Traffic volumes on the Highway 94 corridor
  - The County of San Diego General Plan update and the population forecasts for the Jamul/Dulzura and Mountain Empire community planning areas
  - Cross-border traffic at the Tecate port of entry

RURAL HIGHWAY 94 CORRIDOR: TRANSPORTATION ISSUES

RURAL HIGHWAY 94 CORRIDOR: TRANSPORTATION ISSUES

PROBLEM STATEMENT

A Problem Statement was prepared to identify existing and projected transportation problems on the Rural Highway 94 corridor. Because Highway 94 not only accommodates travel within the San Diego region but also trips to and from Baja California, a U.S.-Mexico binational area was selected for planning purposes.

The study area encompasses the San Diego Region-Baja California border area, as shown in Figure 2. The boundaries of the study area are as follows:

- West boundary: Interstate 805, State Route 54, and the Sweetwater segment of State Route 125 (under construction)
- North Boundary: Interstate 8
- East Boundary: San Diego/Imperial County line
- South Boundary: Northern section of the Municipalities of Tijuana and Tecate, including the Tijuana-Mexicali highways (Free Route 2 and Toll Route 2D) from Mesa de Otay to the vicinity of El Cóndor

Following the Background section, current traffic conditions in the study area are presented. Problems identified by the Policy and Technical Advisory Committees are described afterward, including the following:

- Safety considerations
- Protection of the environment
- Economic considerations
- Projected growth: population and employment
- inational coordination
- Potential for growth inducement

BACKGROUND

Growth and development in the San Diego region will continue to impact traffic on State Route 94. Connecting to Interstate 5 in downtown San Diego, Highway 94 extends east 64 miles to join Interstate 8 in southeastern San Diego County.

State Route 94 is a major commuter route between Downtown San Diego and Jamacha Road, in the community of Rancho San Diego. East of Rancho San Diego, Highway 94 is a winding, two-lane rural highway that serves the communities of Jamul, Dulzura, Barrett Junction, Potrero, Campo, and Boulevard. West of Potrero, the highway connects to State Route 188. Route 188 traverses the community of Tecate and extends for two miles to the Tecate international border crossing.

A distinct characteristic of Highway 94 is its role in international trade. Route 94 is the only east-west link to the U.S. interstate highway system for commercial vehicles crossing at the Tecate port of entry. Linking the communities of Tecate, Baja California, and Tecate, California, the Tecate border crossing is a relatively small gateway for trade between the United States and Mexico.

CURRENT TRAFFIC CONDITIONS

Traffic Volumes

State Route 94

State Route 94 extends 64 miles from Interstate 5, in downtown San Diego, east to the junction with Interstate 8 near Boulevard. The western section of this highway is a major commuter route. Traffic volumes[1] in 1999 reached nearly 196,000 daily vehicles east of the junction with Interstate 805.

From Avocado Boulevard in Rancho San Diego, Highway 94 continues as a four-lane express-way to Jamacha Boulevard. East of this junction, Route 94 is a two-lane conventional rural highway over rolling and mountainous terrain. Highway 94 also connects with State Route 188 where the community of Tecate and the Tecate international border crossing are located.

In 1999, Highway 94 carried 39,500 vehicles daily east of Avocado Boulevard. Traffic volumes averaged 48,500 vehicles west of the junction with Route 54 and 15,600 vehicles east of that junction. Between Steele Canyon Road and Lyons Valley Road, Highway 94 carried 17,100 vehicles. East of Lyons Valley Road, daily volumes dropped to 7,600 vehicles. Between Otay Lakes Road and Dulzura, volumes averaged 6,100 vehicles. The segment of Highway 94 west of Route 188 carried 6,800 daily vehicles. Between Route 188 and Buckman Springs Road, traffic volumes dropped to 1,700 vehicles. East of Buckman Springs Road, volumes ranged between 1,200 and 1,700 daily vehicles.

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[1] SANDAG, *San Diego Region Average Weekday Traffic Volumes,* May 2000.

State Route 188

This two-lane conventional highway extends 1.9 miles, connecting the U.S.-Mexico international border with Highway 94. Two local roads join State Route 188 from the east. Thing Road intersects the highway one-tenth of a mile north of the Tecate port of entry while Humphries Road joins Route 188 one-half of a mile farther north. Tecate Mission Road intersects Route 188 from the west approximately two-tenths of a mile north of the border.

In 1999, daily traffic volumes on Route 188 averaged 6,500 vehicles.

Mexican Federal Highway 2 (MX-2)

Federal Highway 2 is a two-lane facility that connects Tijuana and Mexicali in Baja California. From Mexicali, the highway continues easterly into the State of Sonora. The Tijuana-Mexicali segment runs parallel to the international border for 113 miles. Nearly 32 miles separate Tijuana and Tecate, where Highway 2 connects with Highway 3 to Ensenada. The Tecate to La Rumorosa segment runs for 38 miles. From La Rumorosa to El Centinela, 30 miles west of Mexicali, the highway becomes a toll road (MX-2D).

In 1998, traffic volumes[2] on Highway 2 west of the Rodríguez Dam, near Tijuana, averaged 8,000 daily vehicles. Daily volumes reached nearly 7,000 vehicles at Tecate, dropping to 6,500 vehicles at La Rumorosa. Approaching the city of Mexicali, traffic averaged 13,000 daily vehicles.

Mexican Federal Highway 2D (MX-2D)

This toll road is also known as the Tijuana-Mexicali Highway. The western segment opened in 1992 and begins in the Mesa de Otay district of Tijuana, ending east of the city of Tecate. It is a 22-mile, four-lane, controlled-access highway. At the south entrance to Tecate, Highway 2D connects with Highway 3 to Ensenada. The middle segment between Tecate and La Rumorosa opened to traffic in December 1998 and has a length of 41 miles. The eastern part of Highway 2D runs for 30 miles between La Rumorosa and El Centinela.

Traffic counts in the Tijuana-Tecate segment indicated an average flow of 3,900 daily vehicles in 1998. Volumes between Tecate and La Rumorosa averaged 3,400 vehicles per day in 1999.

Table 1 shows current toll charges at this facility. The cost in U.S. dollars was calculated at an exchange rate of 9.50 pesos to the dollar.

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[2] Secretaría de Comunicaciones y Transporte (SCT), *Aforos Vehiculares*, 1999.

Table 1
Toll Rates
MX-2D Tijuana-Mexicali Highway

Vehicle Type	Tijuana-Tecate Toll Rates		Tecate-La Rumorosa Toll Rates	
	(in Mexican Pesos)	(in U.S. Dollars)	(in Mexican Pesos)	(in U.S. Dollars)
Passenger and light-duty vehicles	$ 50	$ 5.25	$ 38	$ 4.00
Trucks with 2 axles and buses	$ 73	$ 7.70	$ 77	$ 8.10
Trucks with 3 and 4 axles	$ 96	$10.10	$ 125	$13.15
Trucks with 5 and 6 axles	$ 137	$14.40	$ 187	$19.70
Trucks with more than 6 axles	$ 175	$18.42	$ 187	$19.70

Source: *Secretaría de Comunicaciones y Transporte (SCT)*, November 2000

Truck Traffic

About 300 trucks drove across the Tecate port of entry daily in 1997 and nearly three-fourths of them traveled on State Route 94 before or after crossing the border. The remaining 25 percent of commercial trips through the port are between Tecate (California) and Mexico.[3]

In 1997, Caltrans conducted 12-hour vehicle classification counts at several locations on Highway 94. The proportion of trucks at those locations was estimated for a 24-hour period. Table 2 summarizes the truck data. Truck traffic includes both commercial vehicles moving between the San Diego region and Tecate, Baja California, and local truck deliveries accessing the communities along Route 94.

[3] SANDAG, *Tecate Port of Entry: Trade and Truck Traffic*, July 1997.

Table 2
State Route 94
1997 Truck Volumes and Truck Shares of Total Traffic

Location	12-Hour Truck Volumes (6 a.m. to 6 p.m.)	12-Hour Truck Share (6 a.m. to 6 p.m.)	Estimated Daily Truck Share
SR 94 at Singer Lane	599	6.1%	5.5%
SR 94 West of Lyons Valley Road	558	5.4%	4.8%
SR 94 West of Otay Lakes Road	209	5.7%	5.0%
SR 94 East of Barrett Lake Road [a]	222	7.7%	7.1%
SR 94 West of SR 188	228	7.0%	5.1%
SR 94 West of Tierra del Sol	60	11.9%	10.6%

[a] Counts at this location were performed in October 1997.

Source: Caltrans, April 1997 (12-hour counts); SANDAG

Truck traffic on State Route 188 represented approximately seven percent of the total traffic in 1997.

The section of Mexican Highway 2 (free road) from Tijuana to Mexicali carried a high proportion of truck traffic, according to 1998 traffic counts. At the City of Tecate, trucks accounted for 23 percent of all vehicles. Truck shares were even higher both east and west of Tecate. At La Rumorosa, trucks represented 26 percent of the total traffic. At the Rodríguez Dam, the share of truck traffic was 16 percent.

Public Transit

Minimal transit service is available on the rural section of the Route 94 corridor. San Diego County Transit's Route 894 provides one round-trip daily between Cameron Corners, east of Campo, and Grossmont Center, in the City of La Mesa.

Rail Service

The San Diego and Arizona Eastern (SD&AE) Railway runs from downtown San Diego to Plaster City, near El Centro, via Tijuana and Tecate. At Plaster City, the line connects with the Union Pacific Railroad, providing rail links to the entire United States and Mexico. However, segments of the track between Tecate and El Centro, on the "Desert Line," have been out of service since 1983 due to damaged tunnels, bridges, and tracks.

The San Diego and Imperial Valley (SD&IV) Railroad, a subsidiary of RailTex, Inc., is the current freight operator of the line between San Diego and Tecate. The SD&IV Railroad has a long-term operational agreement with the Metropolitan Transit Development Board, the owner of the U.S. section of the rail line.

The National Railways of Mexico has transferred the operating rights of the Tijuana-Tecate section of the line to the State of Baja California. A new agency to administer the rail line has been formed and will be in charge of awarding the concession of the line. The SD&IV Railroad holds a temporary license to transport freight between Tijuana and Tecate.

Currently, limited cargo moves on the SD&AE line, such as deliveries of propane to Tijuana and grain for the Tecate brewery. According to a SANDAG study,[4] the market for a reopened Desert Line appears to be largely in bulk commodities and lower value freight, as opposed to automobiles or intermodal shipments of consumer goods such as televisions.

IDENTIFICATION OF PROBLEMS

The following sections describe issues and concerns related to the rural Highway 94 corridor, which were identified by the Advisory Committees.

Safety Considerations

Concerns regarding the safety of traveling on the rural section of Highway 94 focus on several issues:

- Highway 94's winding alignment and mountainous terrain
- Lack of passing opportunities and queues behind slow-moving vehicles
- Traffic accidents
- Mix of passenger vehicles and trucks
- Size of trucks
- Potential hazards to school buses due to truck traffic
- High driving speeds on some segments of Highway 94
- Inadequate inspection facilities and road infrastructure at the Port of Entry

In 1999, Caltrans, in cooperation with the California Highway Patrol and other agencies, conducted a study to evaluate the potential safety hazards of operating large commercial vehicles on Highway 94. The study analyzed the segment of Highway 94 west of Route 188. The segment of Highway 94 east of Route 188 is currently under study.

[4] SANDAG, *An Updated Market Study for the San Diego and Arizona Eastern (SD&AE) Railway*, June 1999.

The report concluded that Route 94 from Otay Lakes Road to Route 188 has non-standard sections of roadway that inhibit the ability of truck tractor-semitrailers with a kingpin to rear axle length over 30 feet to negotiate the highway without crossing the centerline or going off the existing edge of the pavement.[5]

The study recommended that advisory signs be kept in place with a high level of surveillance by the California Highway Patrol. As an intermediate goal, Caltrans recommended implementing operational improvements in seven locations identified in the report. A longer-term goal is to prepare the appropriate environmental document to improve an additional location. In general, several curves would require realignments and lane widening.

Protection of the Environment

Route 94's rural corridor holds environmentally sensitive resources, including biological, cultural, and visual resources. Accommodating future traffic growth on Highway 94 could impact the corridor's natural and social environment, including the rural character of the small East County communities, and diminish its tourist potential.

Several properties where residential or commercial projects previously had been proposed have been acquired by conservation trusts or government agencies. In 1996, 1,840 acres in Rancho San Diego were transferred to the U.S. Fish and Wildlife Service as part of the San Diego National Wildlife Refuge and the Multiple Species Conservation Program.

In 1997, the Trust for Public Land acquired the 4,800-acre Rancho Jamul, located south of Highway 94 and north of Otay Lakes Road, and the 950-acre Las Montanas Estates near Jamul. Portions of these lands have been conveyed to the U.S. Fish and Wildlife Service and the State of California Department of Fish and Game.

Economic Considerations[6]

The economic livelihood of Tecate, Baja California and Tecate, California is highly dependent upon international trade. In 1995, trucks carried over 430,000 tons of freight, valued at nearly $600 million, through the Tecate port of entry. This freight is moved between Mexico and the United States via State Routes 94 and 188.

While Tecate is an active port of entry, it accommodates a small fraction of all U.S.-Mexico trade moving through California's border ports — less than five percent of the total dollar value of two-way trade. In comparison, Otay Mesa captures almost 67 percent of the current trade flow and Calexico nearly 29 percent.

[5] Caltrans, Truck Restriction Study, State Route 94 (Otay Lakes Road to State Route 188), January 1999.

[6] SANDAG, *Tecate Port of Entry: Trade and Truck Traffic,* July 1997.

Despite a growing population and industrial base in Tecate, Baja California, the Tecate port of entry is not expected to attract a higher proportion of future trade crossing California's border with Mexico: The location of the port of entry is relatively remote, the industrial base in the area is more traditional and less capitalized than industry in Tijuana or Mexicali, and the lack of urban services and housing supply in Tecate, California limits cross-border economic development opportunities. On the other hand, the Tecate port could play a larger role in accommodating cross-border traffic to the extent the Otay Mesa crossing experiences more congestion and longer delays, causing southbound and northbound traffic to divert to the Tecate crossing.

But even if it maintains its current share of trade through California ports, the Tecate crossing likely will become much busier. In real dollars, the total value of freight moving through the Tecate port of entry is forecast to rise from $600 million (1995's level) to $966 million by the year 2000. That represents a real increase of over 60 percent in five years.

By the year 2020, the trade flow could exceed $2.6 billion, although any projection of international trade over such a long period is subject to much uncertainty. This forecast of trade through the Tecate port of entry assumes that the inspection operations and facilities would keep up with the projected increase in international trade. Physical or operational constraints on any particular port of entry may cause the volume of trade to shift to one or more border crossings but would not affect the total volume of binational trade.

Projected Growth: Population and Employment

Population and employment forecasts are used as inputs to prepare traffic projections. Forecasts for the Jamul/Dulzura and Mountain Empire community planning areas as well as for Tecate, Baja California are shown in this section.

Table 3 shows the population and employment forecast for Jamul/Dulzura and Mountain Empire.

Table 3
Rural Highway 94 Corridor Communities:
Growth Forecast 1995-2020

	Jamul/Dulzura			Mountain Empire		
	1995	2020	Percent Change	1995	2020	Percent Change
Population	9,641	18,645	93%	5,926	14,132	138%
Employment	1,236	2,453	98%	1,830	3,506	92%

Source: *SANDAG, 2020 Cities/County Forecast*

Tecate, Baja California, is the second smallest municipality in the State of Baja California, after Playas de Rosarito. INEGI, Mexico's National Institute of Statistics, Geography and Informatics, reported a population of 62,629 for the Municipality of Tecate in 1995. Preliminary data from the population census conducted in April 2000 indicates population has increased to 77,444 residents.

SANDAG developed a population forecast for Tecate, Baja California as part of the Tecate border crossing study. The municipality of Tecate's population is projected to grow at an annual rate of 4.4 percent, reaching nearly 184,000 in 2020.

In 1995, the Municipality of Tecate's total employment was estimated at 26,000. Maquiladora plants provided over 8,300 jobs, or about one-third of the municipality's jobs.

An employment forecast for the Municipality of Tecate was derived from the trade projections prepared as part of SANDAG's study. From 1995 to 2010, job growth is expected to occur at 4.9 percent per year and, from 2010 to 2020, at 4.1 percent annually. Total employment would grow to nearly 80,000 by 2020.

Binational Coordination

Coordination among the federal, state, and local governments in both the Republic of Mexico and the United States is paramount to solving transportation needs at the border. Issues that require binational cooperation include capital and operational improvements at the port of entry facilities and connecting roads, management of existing roadways, and consideration of traffic impacts on border cities and communities.

Specific areas that would benefit from a cooperative binational approach are the proposed improvements to the border stations at Tecate, California and Tecate, Baja California; the potential for physical or operational improvements at the Otay Mesa crossing; the feasibility of opening additional ports of entry along the San Diego Region-Baja California border; and renewed efforts toward the reopening of the San Diego and Arizona Eastern Railway.

Potential for Growth Inducement

In 1998, the Committees identified two projects that are no longer under consideration. They were the potential traffic impacts on the Highway 94 corridor that would result from the proposed rezone in the community of Tecate, California and from the expansion of the Tecate border station.

TRAFFIC PROJECTIONS ACROSS THE TECATE PORT OF ENTRY

TRAFFIC PROJECTIONS ACROSS THE TECATE PORT OF ENTRY

INTRODUCTION

The rural Highway 94 corridor serves travel within the San Diego region and trips to and from Baja California. Traffic growth on this corridor will be affected by development in both the San Diego region and in Tecate, Mexico, along with expansion of international trade.

As a result, traffic on Highway 94 can be projected for two main components: 1) future travel within the San Diego region, and 2) future cross-border travel. The first element largely will be influenced by local land use decisions. The second element will depend, in part, upon operations at the Tecate port of entry.

This chapter deals with cross-border travel. It describes long-range traffic projections through the Tecate border station and several projects that could change the pattern and volume of travel through this port of entry. The magnitude of these possible traffic impacts would depend, in turn, on a range of actions related to the Tecate international crossing.

The intent of this evaluation is to provide an analysis of how various combinations of projects and policies would affect traffic conditions within the binational study area, focusing on Highway 94. Implementation of some of these options would require extensive coordination among local, state, and federal agencies in both the United States and Mexico.

First, this chapter presents a projection of vehicle crossings at the Tecate port of entry based upon population and employment growth forecasts for the San Diego region and for Tecate, Baja California, as well as forecasts of international trade through the Tecate crossing. These vehicle projections were developed as part of previous SANDAG studies.

Second, the traffic impacts on the Tecate port of entry that would result from the following projects were estimated:

- Reopening of the San Diego and Arizona Eastern (SD&AE) Railway to the Imperial Valley
- Construction of an Ensenada-Tecate rail line
- Expansion of the Otay Mesa port of entry or opening of a new East Otay Mesa crossing, along with reductions in toll charges on the Tijuana-Tecate toll road
- Opening of a new port of entry connecting Jacumba and Jacumé

Finally, those potential traffic impacts are summarized under four alternatives, as shown in Table 4, on page 23. These scenarios were created to project the contribution of cross-border traffic to overall traffic volumes on highways 188 and 94 and were suggested by the Advisory Committees.

Alternative 1 assumes no vehicle restrictions through the Tecate port of entry. Alternatives 2 and 3 consider limitations to truck traffic. Under Alternative 2, "large" commercial trucks would be restricted from operating on the rural section of Highway 94 while, under Alternative 3, no commercial vehicles would be allowed across the Tecate port. Finally, Alternative 4 assumes no vehicle crossings through the Tecate border station.

TECATE PORT OF ENTRY: BASELINE TRADE AND TRAFFIC PROJECTIONS[7]

Trade and Truck Traffic Forecast

On a typical weekday, over 300 trucks pass through the Tecate port of entry, and nearly three-fourths of them travel on SR 94 before or after crossing the border. The remaining 25 percent of commercial trips through the port are between Tecate, California and Mexico. For some Mexican exports to the United States, freight is consolidated in warehouses on the U.S. side of the border. Larger shipments involving fewer trucks then are sent north on SR 188 to SR 94. Freight moving in the opposite direction is consolidated as well.

In 1995, trucks carried an estimated 434,000 metric tons of freight through the port. The cargo was valued at nearly $600 million, including both northbound and southbound shipments. The trucks that cross the border at Tecate tend to haul heavier and less valuable cargo (per ton) than those moving through other California border ports.

While Tecate is an active port of entry, it accommodates a small fraction of all U.S.-Mexico trade moving through California's border ports — less than five percent of the total dollar value of two-way trade, as shown in Figure 3. In comparison, the current trade flow, measured in dollars, is 13 times greater through Otay Mesa and seven times greater through Calexico.

Engine of Cross-border Activity: Manufacturing in Tecate, Baja California

With over 62,000 residents, Tecate, Baja California, is the origin or destination of most of the freight that moves through the Tecate port. This municipality employs over 26,000 people, including 8,300 workers in the export-oriented maquiladora industry. Of the municipality's 84 maquiladora plants, Schlage Lock Company is the largest, engaging 1,600 workers in the production of locks and other metal products. The largest non-maquiladora employer is the Tecate brewery, Cervecería Cuauhtémoc Moctezuma. The company's beer exports account for about eight percent of the total truck traffic through the Tecate port.

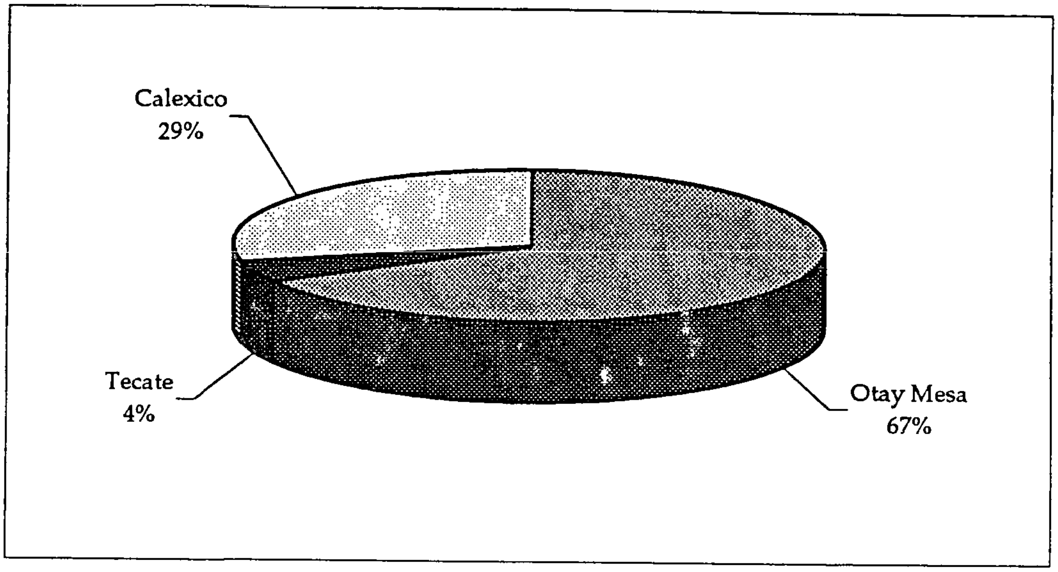
[7] SANDAG, *Tecate Port of Entry: Trade and Truck Traffic,* July 1997.

Table 4
Summary of Projected Vehicle Crossings
Through the Tecate Port of Entry

1995 Two-Way Vehicle Crossings			Potential Projects	2020 Projected Two-Way Vehicle Crossings: Alternative 1 No Vehicle Restrictions			Alternative 2 Truck Size Restrictions			Alternative 3 No Trucks			Alternative 4 No Vehicles		
Passenger Vehicles	Trucks	Total Vehicles		Passenger Vehicles	Trucks	Total Vehicles	Passenger Vehicles	Trucks	Total Vehicles	Passenger Vehicles	Trucks	Total Vehicles	Passenger Vehicles	Trucks	Total Vehicles
			Cross-Border Traffic Projection (Baseline)	12,877	1,223	14,100	12,877	1,223	14,100	12,877	1,223	14,100	0	0	0
			Estimated changes to vehicle crossings due to:												
			1) SD&AE Railway Reopening		-27	-27		-27	-27						
			2) Tecate-Ensenada Railway		31	31		31	31						
			3.a) Otay Mesa Crossing and Tijuana-Tecate Truck Toll Reduction		-121	-121		-502	-502		-723	-723			
			OR												
			3.b) Otay Mesa Crossing and Tijuana-Tecate Truck Toll Removal		-458	-458		-680	-680		-723	-723			
			4) New Jacumba-Jacumé Crossing	-212	-30	-242	-212	-30	-242	-4,146	-500	-4,646			
5,522	292	5,814	**Projected Vehicle Crossings**	12,665	739-1,076	13,404-13,741	12,665	517-695	13,182-13,360	8,731	0	8,731	0	0	0

Source: Caltrans, U.S. Customs, SANDAG (forecasts)

Figure 3
California Border Ports
Current Share of the Value of Surface Freight Moving Between California and Mexico



Source: U.S. Bureau of Transportation Statistics, Transborder Surface Freight Data, April 1994-March 1996

Tecate's economy is forging ahead again, having recently suffered setbacks stemming from the peso devaluation and California's construction slowdown, which depressed sales of concrete/clay tiles and other building materials made in Tecate, Baja California. Employment in the local maquiladora industry has shown strong growth in recent years.

Tecate's population is expected to nearly triple by the year 2020, reaching 184,000 people. Driven primarily by manufacturing, job creation in the municipality likely will match or exceed the rate of population growth.

Despite a growing population and industrial base in Tecate, Baja California, the port of entry that serves that municipality is not expected to attract a higher proportion of future trade crossing California's border with Mexico. The location of the port of entry is relatively remote. The industrial base in the area is more traditional and less capitalized than industry in Tijuana or Mexicali. And the lack of urban services and housing supply in the neighboring town of Tecate, California limits cross-border economic development opportunities. On the other hand, the Tecate port could play a larger role in accommodating transborder traffic to the extent the Otay Mesa crossing experiences more congestion and longer delays, causing southbound and northbound traffic to divert to the Tecate crossing.

Baseline Forecast of Trade and Truck Traffic

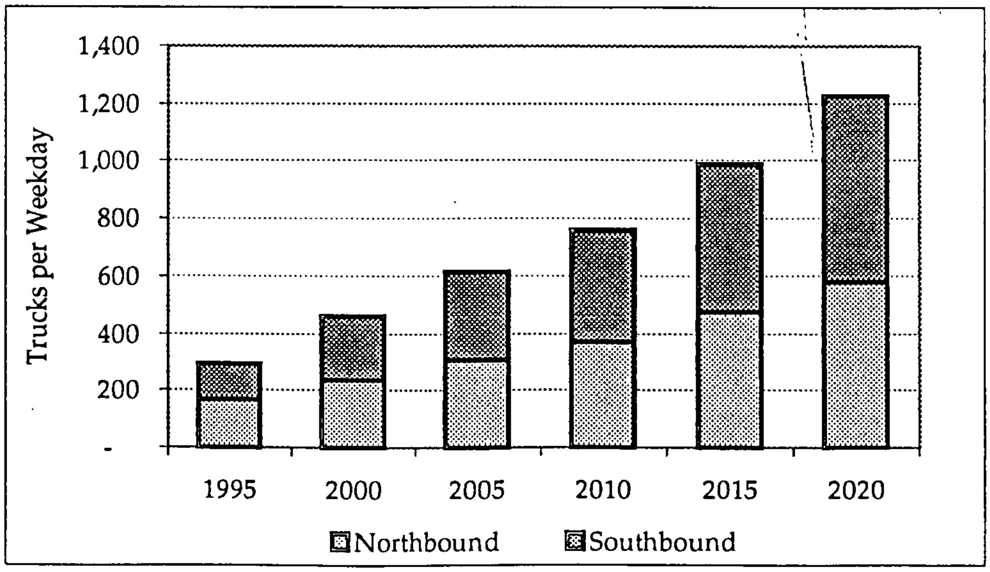
The Tecate port of entry likely will become much busier, even if it maintains its current share of trade through California ports. Truck traffic through the port is expected to quadruple by the year 2020, exceeding 1,220 vehicles daily. Nearer-term, the projection is 460 daily truck crossings in the year 2000, or 57 percent more truck traffic than in 1995. The port's contribution to traffic on SR 94 is expected to rise by similar magnitudes, as shown in Table 5, where three-fourths of the trucks crossing the border also use SR 94. International trade will continue to fuel the traffic volumes. Figure 4 illustrates the forecast of daily truck traffic through the Tecate crossing.

Table 5
Tecate Port of Entry and Junction of State Routes 94/188
Baseline Forecast of Truck Traffic

	Average Trucks per Weekday			
	1995	2000	2010	2020
Tecate Port of Entry:				
Southbound	125	224	390	643
Northbound	167	237	371	580
Total	**292**	**461**	**761**	**1,223**
SR 94/SR 188 Junction*	**211**	**332**	**548**	**880**

*Includes only trucks passing through the Tecate port of entry.
Sources: U.S. Customs Service, Caltrans, and SANDAG (all forecasts)

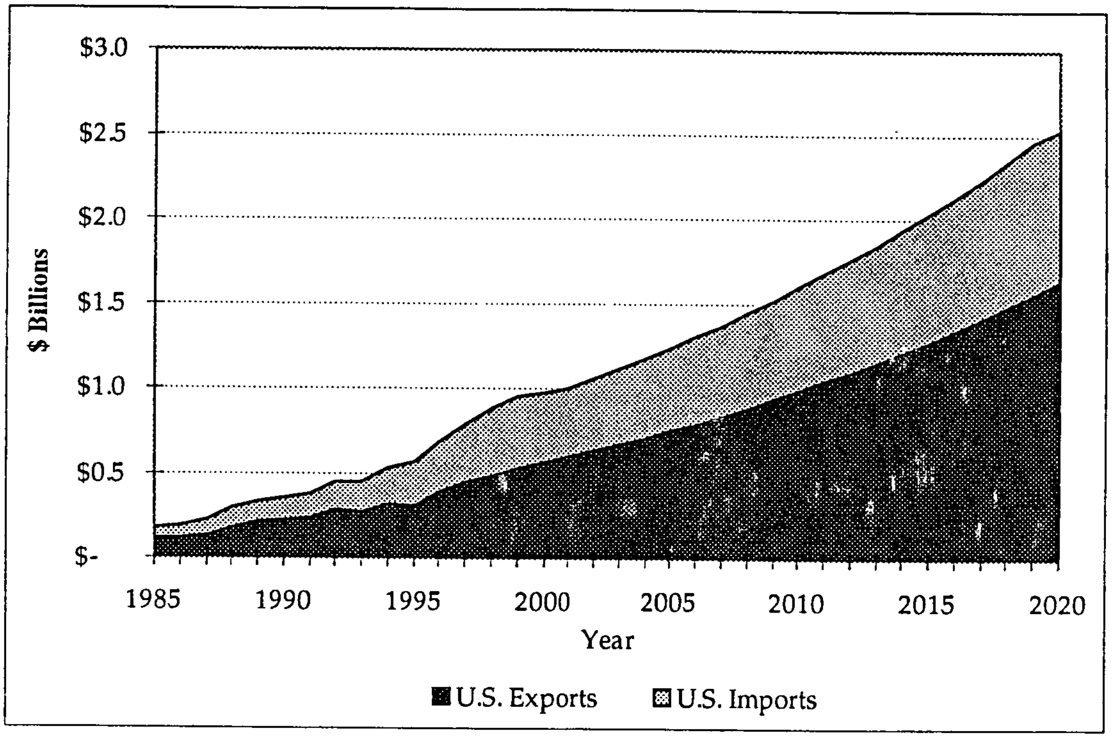
Figure 4
Tecate Port of Entry
Baseline Forecast of Average Daily Truck Crossings



Sources: U.S. Customs Service (1995 northbound trucks), Caltrans survey (1995 southbound trucks), and SANDAG

In *real* dollars, the total value of freight moving through the Tecate port of entry is forecast to increase from $600 million (1995's level) to $966 million by the year 2000, or a real increase of over 60 percent in five years. By the year 2020, the trade flow could surpass $2.6 billion, almost 4.4 times the level in 1995, although any projection of international trade over such a long period is subject to much uncertainty. These trade forecasts are illustrated in Figure 5.

Figure 5
Total U.S.-Mexico Trade Through the Tecate Port of Entry
***Real* 1996 Dollars in Billions**



Sources: California State Department of Finance (1985-1995 trade data for California Customs Districts), U.S. Bureau of Transportation Statistics (1995 Transborder Surface Freight Data), and SANDAG

Trade Outlook

The expected rise in trade through Tecate and other California border ports has roots that extend beyond the expansionary effects of NAFTA, which merely continued a trend of trade liberalization that began in the late 1980s. By lowering the cost of Mexican goods, the peso devaluation in late 1994 raised U.S. demand for Mexican products more than it reduced Mexican demand for U.S. products. One reason is that the surge in U.S. imports has been accompanied by a rise in U.S. exports of intermediate goods to Mexico's maquiladora industry. The result has been a very sizable net gain in total two-way trade during the past three years.

Also, California's economy, dormant for much of the 1990s, is moving forward again. Last year was the first year since 1992 that the percentage rise in exports to Mexico through California's customs districts exceeded that for imports. And with respect to NAFTA, the scheduled reductions in import duties through the year 2000 are proportionately larger for Mexican tariffs than for U.S. tariffs. While any reduction in the cost of exchanging goods between nations should stimulate trade, the disproportionate larger drop in Mexican duties will especially benefit U.S. exporters.

Beyond 2000, the annual rate of growth for U.S.-Mexico trade through California land ports should begin to diminish. The stimulative effect of the peso devaluation on U.S. import demand already is showing signs of abating. This trend should continue, assuming continued stability of the Mexican currency. Furthermore, under NAFTA, the largest barriers to trade already have been eliminated or are scheduled to expire over the next three years. Additional stimulus beyond 2000 largely will depend upon normal economic growth in both the United States and Mexico.

Baseline Forecast of Passenger Vehicle Traffic[8]

The forecast of passenger vehicles through the Tecate port of entry takes into account growth factors in both the San Diego region and the Municipality of Tecate, Baja California. This forecast was prepared in 1997 following the methodology developed for SANDAG by Wilbur Smith and Associates in its feasibility study for the proposed toll road (State Route 11) to the U.S.-Mexico border[9]

Trip productions and attractions were obtained from a vehicle survey conducted by Caltrans at the Tecate border crossing.[10] The share of trips by purpose (i.e., work, shopping trips) also was obtained from the same survey.

Two variables were selected to forecast vehicle trips across the Tecate port of entry: population and employment. SANDAG's Series 8 Regional Growth Forecasts are the source for the population and employment growth rates for the San Diego region. The population forecast for the Municipality of Tecate, Baja California was developed as part of SANDAG's *Tecate Port of Entry: Trade and Truck Traffic* study. Projections of employment for Tecate, Baja California were prepared for this traffic study.

For the San Diego region, population is forecast to grow at an annual average rate of 1.7 percent to the year 2015. Employment is predicted to increase at 1.1 percent average per year for the same forecast period.

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[8] SANDAG, *State Route 94 Corridor: Long-Range Traffic Forecasts*, September 1997.

[9] SANDAG, *Preliminary Feasibility Analysis for the Provision of a Toll Road Extension to the International Border*, December 1994.

[10] Caltrans vehicle survey conducted on March 23, 1993 at the Tecate port of entry.

The population for the municipality of Tecate is projected to grow at a rate of 4.4 percent average per year to the year 2020. Tecate's employment forecast was derived from the trade projections prepared for SANDAG's trade study. From 1995 to 2010, job growth is expected to occur at almost five percent average per year and, from 2010 to 2020, at a four percent annual average.

Work trips produced in Mexico were forecast using the projected employment growth rate for the San Diego region. Likewise, Tecate's employment growth rate was applied to work trips produced in the San Diego region. Other trip purposes are assumed to depend upon population increases; therefore, the population growth rates for the San Diego region and for Tecate, Baja California were used to forecast non-work trips.

The population and employment growth rates described in the previous paragraphs were applied to Tecate's annual vehicle crossings in the northbound direction for 1995. This methodology resulted in a forecast of nearly 1,825,000 northbound vehicles for the year 2010 and approximately 2,629,000 northbound vehicles for the year 2020. These projections represent an average annual growth rate of 3.6 percent for the period between 1995 and 2020.

Historical count data indicate that traffic on State Route 188 is balanced in both the northbound and southbound directions. Therefore, the northbound vehicle forecast was doubled to represent total traffic crossing the port of entry in both directions. The annual vehicle forecast finally was converted to average weekday traffic, as shown in Table 6.

Table 6
Projection of Average Weekday Traffic
Across the Tecate Port of Entry

Year	Total Vehicles (Two-Way)
1995	5,814
2010	9,789
2020	14,100

Source: U.S. Customs and Caltrans (1995), SANDAG (forecast)

ESTIMATED TRAFFIC IMPACTS OF POTENTIAL PROJECTS

Reopening of the San Diego and Arizona Eastern Railway[11]

The San Diego and Arizona Eastern (SD&AE) line runs for about 150 miles from downtown San Diego to Plaster City, near El Centro, via Tijuana and Tecate. At Plaster City, the line connects with the Union Pacific Railroad, providing rail links to the entire United States and Mexico. However, segments of the track between Tecate and El Centro, on the "Desert Line," have been out of service since 1983 due to damaged tunnels, bridges, and tracks.

The San Diego and Imperial Valley (SD&IV) Railroad currently provides freight service between San Diego and Tecate. The Mexican government owns the 44-mile section of the line that runs between Tijuana and Tecate and has granted a temporary license to the SD&IV Railroad to transport freight on it. The privatization of this section of the line is under negotiation.

Impact on Truck Traffic Through the Tecate Port of Entry

A 1995 market study by SANDAG estimated the freight potentials of the SD&IV railroad, assuming restoration of the Desert Line.[12] The shipment of maquiladora finished products to the United States was identified as one possibility. In 1995, an estimated 12,900 containers and trailers of maquiladora goods were moved by truck from Tijuana, Tecate, and Ensenada to Los Angeles and San Bernardino and placed on rail for transport to the U.S. Southwest and Midwest.

Through its connection with the Union Pacific Railroad, the SD&IV Railroad could offer less costly and more direct service to the U.S. market, according to the SANDAG study.

Although the study did not delineate potential rail shipments from each Mexican municipality, Tecate's share is estimated in this report to have been 1,000 truck loads in 1995, or 7.8 percent of Tecate's 1995 share of the maquiladora industry employment in Baja California, excluding Mexicali.[13] Mexicali already is served by the Union Pacific Railroad. Also, this estimate includes only new freight, not existing rail shipments to Baja California, including Tecate, on the operational sections of the SD&AE line and the Mexican Tijuana-Tecate line.

If the estimated rail freight potential for Tecate, Mexico (1,000 truck loads in 1995) grows in proportion to the municipality's exports, then restoration of the SD&AE's Desert Line would reduce northbound truck traffic by the volumes shown in Table 7. Trucks transporting maquiladora finished products to rail yards in Southern California often return empty. A maximum allowance for empty trucks also is shown in Table 7.

[11] SANDAG, *Tecate Port of Entry: Trade and Truck Traffic,* July 1997.

[12] SANDAG, *Economic Feasibility Study of the San Diego and Arizona Eastern Railway,* March 1996.

[13] INEGI, *Estadística de la Industria Maquiladora de Exportación, 1990-1995* (1996).

Table 7
Reopening the SD&AE Railway
Projected Decrease in Truck Crossings
Through the Tecate Port of Entry

	2010	2020
Loaded Trucks Per Year	2,219	3,473
Empty Trucks Per Year	2,219	3,473
Total Trucks Per Year	4,439	6,946
Reduction in Trucks Per Weekday	**17**	**27**

Source: SANDAG

An update of the SD&AE Railway market study was prepared since the above estimates were developed.[14] In 1996, the largest segments of projected traffic in Modern Service were truck traffic (35 percent) and containerized hay (30 percent), followed by grain (24 percent) and automobiles and parts (8 percent). In 1999, the significant sectors for Modern Service are in hay (18 percent), truck traffic (19 percent), municipal solid waste (9 percent), manufactured trailers and containers (16 percent), and cement and backhaul sand (5 percent each). For Basic Service, a similar shift occurred, away from grains and hay (87 percent down to 29 percent), toward a wider market minus the container traffic.

Low-value products such as solid waste, as well as selected manufactured goods, offer good intermodal potential for the SD&AE. For example, an exceptional opportunity for the SD&AE is the transport of shipping trailers and containers manufactured at the Hyundai Precision plant in Tijuana. These various products require an intermodal facility for truck-to-rail transfers and, until one can be built on each side of the border, a site in the United States could best serve both regions.

The market for containers, chassis, and trailers identified in the 1999 study update would make up for the lower projections of maquiladora goods that would be transported by rail. Thus, the projections presented in Table 7 remain reasonable.

Proposed Ensenada-Tecate Rail Service[15]

The U.S. - Pacific Rim Market for Waterborne Commerce

In addition to maquiladora trade, the Port of Ensenada could attract freight moving between the United States and foreign countries — shipments that otherwise would be handled by California seaports, particularly those in Los Angeles, Long Beach, and San Diego. To be competitive

[14] SANDAG, *An Updated Market Study for the San Diego and Arizona Eastern (SD&AE) Railway,* June 1999.
[15] SANDAG, *Tecate Port of Entry: Trade and Truck Traffic,* July 1997.

with Southern California ports, the Port of Ensenada probably will require rail service. The ports in Los Angeles, Long Beach, and San Diego are served by at least one Class I railroad.

The prospects of building a rail line connecting Ensenada and Tecate have been discussed, but no specific project has been proposed. The new rail line would connect with the existing Tijuana-Tecate railroad in Tecate and link to the San Diego and Arizona Eastern (SD&AE) Railway. As described subsequently, a new Ensenada-Tecate rail line would be of little use unless the eastern segment of the SD&AE line, or Desert Line, is repaired and reopened for freight service.

Currently, seaports in Southern California receive cargo from places throughout the United States for waterborne export to many countries on the Pacific Rim. They also receive foreign imports for overland shipment in the U.S. domestic market. As shown in Table 8, international shipments through Long Beach, Los Angeles, and San Diego totaled 56.0 million metric tons in 1995, compared to nearly 35.7 million tons in 1985, reflecting an annual average growth rate of 5.0 percent over the ten-year period. International exports have grown faster than imports, as shown in Table 9. These tonnage figures exclude domestic shipments, which are defined as cargoes having both an origin and destination in the United States.

Table 8
Southern California Seaports, International Waterborne Cargo
(Metric Tons)

California Seaport	1985			1995		
	Imports	**Exports**	**Total**	**Imports**	**Exports**	**Total**
Long Beach	10,424,578	8,522,292	18,946,870	14,540,503	15,903,580	30,444,083
Los Angeles	8,577,388	6,839,766	15,417,155	12,318,539	12,604,296	24,922,835
San Diego	699,709	612,603	1,312,312	235,081	432,995	668,076
Total	**19,701,675**	**15,974,661**	**35,676,336**	**27,094,123**	**28,940,872**	**56,034,995**

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center

Although the Port of Ensenada's cargo tonnage has not grown on a consistent basis since 1990, the port's new international operator combined with the availability of rail service may enable the port to participate in the market for trans-Pacific Ocean shipments to and from the United States. Again, in this market, the Ensenada port would be competing primarily with Southern California seaports, which have better transportation access and infrastructure. On the other hand, Ensenada may have advantages in terms of less traffic congestion and lower cargo handling costs.

Ensenada probably will attract additional commerce in other maritime markets as well, including the Mexican domestic trade and waterborne export of local agricultural products and fish. But growth in these markets would not have a significant impact on transborder surface freight between California and Baja California.

Table 9
Southern California Seaports
Growth in Waterborne International Cargo
(Metric Tons)

	1985-1995	
International Cargo	**Total Increase**	**Percent of Total**
Total Imports	7,392,447	36.3%
Total Exports	12,966,211	63.7%
Total Cargo in Metric Tons	**20,358,658**	**100.0%**
Total International Cargo Annual Average % Increase	**5.0%**	

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center

For the U.S.- Pacific Rim market, a projection of additional cargo through the Port of Ensenada is shown in Table 10 for both exports and imports. Excluded from this table is potential cargo from maquiladora intermediate products, discussed previously.

In this market, additional waterborne cargo for the Port of Ensenada is projected at 226,000 metric tons in the year 2000 and approximately 2 million tons in the year 2020. These volumes would be in addition to the port's current cargo volume of 820,000 metric tons, assuming the port maintains its current base of support.

Table 10
Port of Ensenada
Projected New Waterborne Cargo From U.S.-Pacific Rim Market
(Excludes Potential Maquiladora Cargo)

	Metric Tons	
	2010	**2020**
TRUCK FREIGHT		
From United States to Port of Ensenada (Waterborne Exports)	311,422	688,797
From Port of Ensenada to United States (Waterborne Imports)	175,175	387,449
Total Truck Metric Tons	**486,597**	**1,076,246**
RAIL FREIGHT		
From United States to Port of Ensenada (Waterborne Exports)	254,800	563,562
From Port of Ensenada to United States (Waterborne Imports)	143,325	317,003
Total Rail Metric Tons	**398,124**	**880,565**
TOTAL TRUCK/RAIL FREIGHT		
From United States to Port of Ensenada (Waterborne Exports)	566,222	1,252,359
From Port of Ensenada to United States (Waterborne Imports)	318,500	704,452
Total Metric Tons	**884,721**	**1,956,811**

Source: SANDAG

Other assumptions supporting these forecasts:

1. An Ensenada-Tecate rail line will be built by the year 2010.

2. The Desert Line of the SD&AE Railway will be reopened for freight service prior to completion of the Ensenada-Tecate line.

3. The Port of Ensenada's total cargo tonnage, excluding increased imports of maquiladora products, will grow by five percent annually. This growth rate is the combined historical average, 1985-1995, for the ports of Los Angeles, Long Beach, and San Diego, and it includes only waterborne international cargo originating in or destined for the U.S. domestic market.

4. For the projected increase in cargo tonnage through the Port of Ensenada, exports and imports will comprise 36 percent and 64 percent of the total, respectively. These shares are the ten-year historical averages for the ports of Los Angeles, Long Beach, and San Diego.

5. For overland shipments to and from the Port of Ensenada, rail will carry 45 percent of the tonnage beginning in 2010. The comparable percentages at the ports of Los Angeles and Long Beach are 55 percent and 40 percent, respectively. Both numbers are estimates obtained from the port operators, and both percentages exclude shipments of petroleum.

Impact on Truck Traffic Through Tecate

As the Port of Ensenada's cargo operations grow, the Tecate border crossing would capture more freight movements between Ensenada and Tecate, in proportion to its current share of the value of freight moving through California border ports. However, the Port's cargo operations are not expected to have a major effect on truck traffic through the Tecate port of entry.

Of the highways linking Ensenada to the border, Highway 1 is the preferred route for shipping goods to the United States. The remaining commercial vehicle traffic bound for the United States uses Highway 3 to Tecate and Highway 5 to Mexicali. In addition, rail would carry a sizable share (estimated at 45%) of the Port's exports and imports, assuming a rail line is built between Ensenada and Tecate.

From Ensenada, most freight currently exported to the United States is transported by truck. A 1996 study by the U.S. General Services Administration found that 80 percent of these trucks transport their goods to Tijuana, which is the shortest route.[16] Tijuana-bound trucks travel north on Highway 1. For other exports, Mexicali is the preferred port of entry over Tecate because it is a transportation hub for the southwestern United States and the mainland of Mexico. Mexicali-bound trucks travel south from Ensenada on Highway 3, which turns east across the Baja peninsula to San Felipe. The trucks then turn north on Route 5 and go on to Mexicali. This route is used because it is relatively flat compared to the mountainous routes from Ensenada to Tecate via Highway 3 and from Tecate to Mexicali. However, trucks will use the Ensenada-Tecate route when congestion is anticipated at Tijuana and when the alternate route to Mexicali is out of service during rain storms.

By the year 2020, the Port of Ensenada's level of cargo from the U.S.-Pacific Rim market is projected to cause the number of truck crossings through Tecate to rise by about 30 per day, as indicated in Table 11.

[16] U.S. General Services Administration, *Environmental Assessment: Modifications for the Port of Entry in Tecate, California*, March 1997.

Table 11
Tecate Port of Entry
Projected Impact of the Port of Ensenada's Potential Cargo
From U.S. Pacific-Rim Market
(Excludes Potential Maquiladora Cargo)

	Metric Tons	
CROSS-BORDER TRUCK FREIGHT	**2010**	**2020**
Additional Truck Freight in Metric Tons:		
Southbound Shipments to Port of Ensenada	17,440	38,573
Northbound Shipments from Port of Ensenada	5,781	12,786
Total Metric Tons		
CROSS-BORDER TRUCKS	**2010**	**2020**
Number of Southbound Trucks:[1]	2,474	5,471
Average Trucks per Weekday	10	21
Number of Northbound Trucks:[2]	1,233	2,726
Average Trucks per Weekday	5	10
Total Additional Truck Crossings:		
Annual Truck Crossings	3,706	8,197
Average Trucks per Weekday	**15**	**31**
ENSENADA-TECATE RAIL LINE CROSS-BORDER RAIL FREIGHT	**2010**	**2020**
Southbound Shipments to Port of Ensenada	254,800	563,562
Northbound Shipments from Port of Ensenada	143,325	317,003
Total Metric Tons	398,124	880,565

[1]Based upon 7.05 metric tons per truck, the 1995 average for all California ports of entry.
[2]Based upon 4.69 metric tons per truck, the 1995 average for the Tecate port of entry.
Source: SANDAG

The projections shown in Table 11 exclude shipments of maquiladora inputs that are assumed to come into Mexico via the Port of Ensenada instead of by truck from the ports of Los Angeles and Long Beach. These waterborne shipments would reduce traffic through Tecate and are estimated separately (see discussion above).

The projections shown in Table 11 are based upon the assumption that 5.6 percent of the total southbound truck tonnage to the Port of Ensenada and 3.3 percent of the total northbound tonnage will be transported via the Tecate crossing. (These percentages are equivalent to Tecate's average annual share of the value of freight that moved through all California border ports in 1994 and 1995.) Also, Tecate's current average freight weight per truck in each direction is assumed to apply to the projected shipments to and from the Port of Ensenada. Because current average freight weights account for both loaded and empty trucks, the projections of truck traffic to and from the Port of Ensenada make no separate allowance for empty trucks.

Rail shipments between the Tecate port of entry and the Port of Ensenada are projected to be 880,000 metric tons in the year 2020, which corresponds to roughly 35-45 loaded rail cars per day. Again, this assumes that 45 percent of the Port of Ensenada's intermodal cargo will go by rail.

Otay Mesa Border Crossing and Tijuana-Tecate Toll Road (MX-2D)

Considerable reductions in "wait times" for commercial vehicles at the Otay Mesa crossing would be necessary to make the Otay Mesa crossing a true option to the Tecate port. Additionally, lowering or eliminating toll charges for trucks on the Tijuana-Tecate toll road would make the Otay Mesa port still a more valuable alternative to the Tecate crossing.

Increasing the attractiveness of the Otay Mesa crossing in relation to the Tecate port could modify traffic patterns and result in lower truck volumes on Highway 94. For some U.S. exports, the Otay Mesa port of entry might become the preferred route for transporting goods to Tecate, Baja California, via MX-2D. The same could be said about shipments originating in Tecate and destined for the United States. That is, comparable "wait times" at both crossings and low-priced tolls on MX-2D would provide lower-cost access to and from Tecate through an alternate port of entry, reducing traffic through the Tecate crossing.

Lowering "wait times" at Otay Mesa could be achieved through various projects or policies, including physical expansion of the existing facilities, increasing hours of operation, or opening the East Otay Mesa crossing.

A 1994 study[17] evaluated the feasibility of constructing State Route 11 as the first toll facility that would serve a border crossing between California and Baja California. This crossing would be the proposed East Otay Mesa-Mesa de Otay II port of entry. According to the study, SR 11 might be financially feasible without outside financial assistance after its first eight years of operation.

The feasibility study did not identify any traffic diversion from the Tecate port of entry to the future East Otay Mesa crossing. All traffic projected to cross at the new port would be diverted from San Ysidro-Puerta México and Otay Mesa-Mesa de Otay.

[17] SANDAG, *Preliminary Feasibility Analysis for the Provision of a Toll Road Extension to the International Border,* December 1994.

Two scenarios were evaluated: 50 percent reduction of toll charges for trucks (Alternative 3.a) and elimination of tolls for trucks (Alternative 3.b).

Impact on Truck Traffic Through the Tecate Port of Entry: 50 Percent Reduction in Truck Tolls

This section describes truck diversion between Tecate and Tijuana under two potential options:

- No truck size restrictions
- Truck-size restrictions on Highways 188 and 94

Under both options, it is assumed that toll charges for trucks are cut by 50 percent and that "wait times" for commercial vehicles at Otay Mesa would be similar to those at Tecate.

No truck size restrictions — If no truck restrictions were imposed, an incentive to shippers to use the Otay Mesa crossing could be provided by reducing toll charges on the Tijuana-Tecate toll road. According to the toll road concessionaire, a pilot program was implemented in 1996 whereby toll charges for trucks were reduced between 40 percent and 60 percent, depending upon the size of the trucks.

However, after the toll reductions, truck volumes on this road remained fairly stable. These results may have been due to the short duration of the program (about 3 months). In addition, for cross-border shipments into San Diego, the lower cost and time savings gained by using the toll road likely were not sufficient to offset the "wait times" at the Otay Mesa crossing.

The governmental agency that operates the toll road between Tijuana and Ensenada (MX-1D) reduced toll charges for trucks in January of 1998. The rates for trucks were lowered to match the passenger vehicle rates. Tolls are charged at three locations between Tijuana and Ensenada and, in 1998, they were approximately $1.60 per segment (or 16 Mexican Pesos).

A comparison of truck volumes at the Rosarito toll booth between 1997 and 1998 (from January to September) showed a substantial increase in truck traffic.[18] The average toll for trucks was reduced by 50 percent and resulted in an increase of 78 percent in the volume of trucks over the nine-month period. In comparison, automobile traffic grew by about three percent over the same period.

For this study, it was assumed that if tolls for trucks were reduced on the Tijuana-Tecate highway, increases in truck traffic would be proportional to the cutback in tolls. That is, a 50 percent drop in tolls would result in a 50 percent increase in truck traffic.

Currently, truck traffic represents about eight percent of the total traffic on the toll road. Between ten percent and 12 percent of those trucks are estimated to cross the border at Otay Mesa. Taking into account traffic growth on the toll road, approximately 120 trucks per day would be diverted from Tecate to Otay Mesa in 2020. This figure includes the new truck traffic that would use the Tijuana-Tecate toll road as a result of lower toll charges.

[18] CAPUFE, *Comparativo de Aforo Vehicular de 1997 y 1998, Caseta 35 Rosarito, Baja California,* October 1998.

Truck-size restrictions on Highways 188 and 94 — Under the alternative with restrictions to truck size, this evaluation assumes commercial vehicles with four or more axles would be restricted from operating on Highways 188 and 94. In addition, it is assumed that local-serving truck deliveries are made with trucks with fewer than four axles.

Caltrans is authorized to restrict vehicle length only from 40 feet to 38 feet from kingpin to rear axle based upon safety considerations.

According to vehicle classification counts conducted at the Tecate port of entry (Caltrans, April 1997), 57 percent of the trucks traveling on Route 188 just south of the junction with Highway 94 had four or more axles. This figure reflects the cargo consolidation that takes place in Tecate, California, since the proportion of trucks with four or more axles at the port of entry is about 45 percent.

In 2020, 880 trucks are projected to travel daily on Highway 94 east or west of Route 188. If 57 percent of those trucks were not allowed to use these two highways, cross-border shipments with origins or destinations in Tecate, Baja California would travel on the Tijuana-Mexicali highways and cross the border at Otay Mesa or ports of entry east of Tecate.

Approximately 500 trucks per day would be diverted from the Tecate crossing to other border crossings. The vast majority of cargo would use the Otay Mesa port of entry and travel between Tijuana and Tecate on the Mexican Route 2 or the Tijuana-Tecate toll road (Route 2D). This should be considered the maximum potential reduction in large trucks across the Tecate port of entry since shippers, in some cases, may choose to break up loads and dispatch more trucks of smaller size.

Vehicle projections through the Tecate crossing were prepared for an additional scenario which, in addition to assuming improvements to the Otay Mesa port of entry, considers the removal of toll charges for truck traffic on the Tijuana-Tecate toll road. This alternative is presented under option 3.b in Table 4, on page 23.

Otay Mesa Border Crossing and No Tolls for Trucks on the Tijuana-Tecate Highway

Time and Distance Evaluation

The time and distance it would take for a trip between downtown Tecate, Baja California and a common point (San Diego-Orange County line) was evaluated under two alternative routes:

a. Across the Tecate port of entry, via Highways 188 and 94, and Interstates 805 and 5.

b. Via the Tijuana-Tecate toll road, across the Otay Mesa port of entry, on to future SR 905, and Interstates 805 and 5.

The time and distance calculations show that both routes are almost equally competitive. On the Tijuana-Tecate highway and Otay Mesa crossing route, a one-way trip would take an additional 1.5 minutes and about 6.5 miles longer than the route via the Tecate crossing and Highway 94. Therefore, the difference in time and distance between the two routes is practically negligible.

For both routes, no delay is assumed at the port of entry and truck speeds over the two routes represent free flow conditions.

Impact on Truck Traffic through the Tecate Port of Entry: No Tolls for Trucks

Currently, the main barriers to shipping to and from Tecate, Baja California via the Otay Mesa crossing are the wait times at Otay Mesa and the additional transportation cost of approximately $10 each way for toll charges. If these two barriers were removed, and as a result of the comparable time and distance for the two alternative routes, over time it would be expected that about one-half of the cross-border truck shipments would choose to travel across the Tecate port of entry and the other one-half would cross at Otay Mesa.

Therefore, for "western market" freight, removal of toll charges for trucks on Route 2D, in combination with shortening wait times at the Otay Mesa port of entry, could result in significant truck traffic diversion from the Tecate port to the Otay Mesa crossing.

However, the elimination of tolls for truck traffic on the Tijuana-Tecate toll road also could induce some commercial vehicles to use the Tecate port instead of Otay Mesa for freight moving between Tijuana and U.S. eastern markets. Truck volumes, thus, could increase on the section of Highway 94 east of Route 188.

This section describes truck diversion for "western market" cargo between the Tecate and the Otay Mesa crossings under two potential options:

- No truck size restrictions
- Truck-size restrictions on Highways 188 and 94

Under both options, it is assumed that "wait times" for commercial vehicles at Otay Mesa would be similar to those at Tecate.

No truck size restrictions — In 2020, approximately 916 cross-border trucks are projected to travel between U.S. "western markets" and Tecate, Baja California. If one-half of those trucks were to cross at the Otay Mesa port, then the remaining 460 trucks would travel on Highway 94 west of Route 188. The assumptions under this scenario are equal wait times at the Otay Mesa and Tecate ports of entry and no tolls for truck traffic on the Tijuana-Tecate highway.

Truck-size restrictions on Highways 188 and 94 — Under the alternative with restrictions to truck size, this analysis assumes commercial vehicles with four or more axles would be restricted from operating on Highways 188 and 94. Moreover, it is assumed that local-serving truck deliveries are made with trucks with fewer than four axles.

In 2020, about 200 trucks would be expected to use Highway 94 (east or west of Route 188). The rest of the commercial vehicles that otherwise would have used the Tecate crossing would travel on Mexican highways and likely cross at the Otay Mesa POE. Truck diversion from the Tecate POE is projected at 680 vehicles. Again, this should be considered the maximum potential reduction in large trucks across the Tecate port of entry since shippers may break up loads and dispatch more trucks of smaller size.

Future Jacumba-Jacumé Port of Entry

One option to improve traffic conditions along California's border with Mexico could be the opening of a new port of entry linking Jacumba, in San Diego County, and Jacumé, in the Municipality of Tecate. SAHOPE, Baja California's state planning agency, also has considered this location as a future border crossing in its long-range planning work.

Sponsored by Caltrans, District 11, SANDAG prepared a study to evaluate the feasibility of a future international border crossing at Jacumba-Jacumé. Findings and recommendations from this study are summarized in this section.[19]

Jacumba is a small community located about 70 miles southeast of downtown San Diego. Situated immediately south of Jacumba is the tiny Mexican town of Jacumé with about 300 residents.

One advantage of a port of entry connecting those two communities is its proximity to major transportation corridors both in the United States and in Mexico: Interstate 8 and the Tijuana-Tecate-Mexicali free (MX-2) and toll (MX-2D) highways. The distance between Interstate 8 and the new port of entry would be between three and five miles. An eight-mile road would connect the border crossing with the toll road (MX-2D). One mile further south is the junction with the free highway (MX-2).

The potential location of the Jacumba-Jacumé port of entry and its major access routes are illustrated in Figure 6.

In December 1998, the toll road between Tecate and La Rumorosa opened to traffic. Currently, only a dirt road provides access between Jacumé and the Tijuana-Mexicali highways. In addition to the inspection facilities needed by federal and state agencies in both countries, the roadways connecting Interstate 8 in California and MX-2 and MX-2D in Baja California would need to be improved or built.

A border crossing at Jacumba would improve border access for some trucks that use Interstate 8 to transport goods between Baja California and locations east of San Diego. However, traffic to and from these "eastern markets" accounts for a small fraction of cross-border commercial traffic. Just over four percent of the trucks that cross the border at Tecate and Otay Mesa travel on Interstate 8. Most of the truck traffic to and from the border moves on Interstate 5, Interstate 805, and Interstate 15, and these freeways are more accessible to Otay Mesa and Tecate than Jacumba.

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[19] SANDAG, *Feasibility of Opening an International Border Crossing at Jacumba-Jacumé*, June 2000.

Forecast of Vehicle Crossings Across Jacumba-Jacumé

Future traffic volumes across the Jacumba-Jacumé port of entry will depend in part on the level of cross-border traffic the existing ports of entry along the California-Mexico border are able to accommodate. The future East Otay Mesa-Mesa de Otay II border crossing will increase vehicular capacity in the San Diego-Tijuana area. The upgrades approved at the Tecate, California border station are not intended to increase the vehicle handling capacity of the port but to improve the inspection facilities. Enhancements to the cargo inspection facilities are also planned at Tecate, Baja California, in addition to improvements to commercial vehicle routing and circulation within the City of Tecate.

Forecasts of traffic through Jacumba-Jacumé were prepared for the year 2020 for three scenarios, based upon the assumption that this new border crossing would be operational by 2010:

- Tecate's existing port of entry remains open for all vehicles
- The Tecate port of entry accommodates the 1999 level of vehicle crossings through 2020, due to capacity constraints
- Tecate's existing port of entry stops handling commercial vehicles by the year 2010

The projected levels of truck traffic through Jacumba do not reflect expanded trade between California and Mexico, but rather diversion of freight that otherwise would be transported through the ports of entry in Tecate and Otay Mesa. Table 12 summarizes the vehicle forecasts across the Jacumba-Jacumé crossing.

Table 12
Projected Daily Traffic through Jacumba-Jacumé Port of Entry
Year 2020

	Trucks	Passenger Vehicles	Total Vehicles
1. Jacumba with Tecate POE open to all vehicles	464	1,017	1,481
2. Jacumba with Tecate POE maintaining 1999 vehicle crossings	747	3,379	4,126
3. Jacumba with Tecate POE open, except commercial vehicles	934	4,951	5,885

Source: SANDAG

With the Tecate crossing remaining open to commercial traffic, a port of entry in Jacumba-Jacumé would attract over 450 trucks per day in 2020. Passenger vehicle traffic is estimated at slightly over 1,000 daily vehicles for the same year. Two-way daily traffic, therefore, would amount to approximately 1,500 vehicles.

If the Tecate border crossing maintains the 1999 level of vehicle traffic through 2020, the Jacumba-Jacumé port of entry would accommodate approximately 4,100 vehicles per day, both northbound and southbound. Nearly 750 trucks and almost 3,400 passenger vehicles would use the new port of entry daily.

If the Tecate port of entry were to stop processing commercial vehicles, traffic volumes through a new port of entry at Jacumba would increase substantially. Daily crossings would reach nearly 5,900 vehicles. Trucks would account for 934 two-way crossings while passenger vehicles would make up the remaining 4,900 vehicles.

Under the scenario where the Tecate port stops processing commercial vehicles, new business growth would be expected to take place in the eastern section of the Municipality of Tecate, and subsequent increases in population, employment, and passenger-related traffic also would likely occur.

Impact on Vehicular Traffic Through the Tecate Port of Entry

Table 13 summarizes the projected traffic diversion from the Tecate port of entry to the Jacumba-Jacumé border crossing under the three scenarios described above. The feasibility study also includes projected traffic diversion to and from the San Ysidro and Otay Mesa ports of entry and the future Jacumba crossing.

Table 13
Projected Traffic Diversion from the Tecate Port of Entry
to the Jacumba Port of Entry
Year 2020

Scenarios	Trucks	Passenger Vehicles	Total
	(Average Daily)		
1. With Tecate Open to all Vehicles	30	212	242
2. Tecate Maintains 1999 Traffic Levels through 2020	313	2,574	2,887
3. With Tecate Open, except Commercial Vehicles	500	4,146	4,646

Source: SANDAG

LONG-RANGE TRAFFIC FORECASTS

LONG-RANGE TRAFFIC FORECASTS

DESCRIPTION OF ALTERNATIVES

Traffic projections for 2020 were prepared for eight alternatives, as described below.

The *No Build* Alternatives reflect no improvements to Highway 94. The number of vehicles across the Tecate port of entry was updated for each scenario to represent different operational situations, as follows:

Alternative 1:	No vehicle restrictions through the Tecate port of entry (demand forecast)
Alternative 2:	Truck size restrictions
Alternative 3:	No trucks through the Tecate port of entry
Alternative 4:	Maintains the 1999 volume of vehicle crossing through the Tecate port of entry in the year 2020

Alternative 3, which assumed no trucks would be processed at the Tecate port of entry, was eliminated from further evaluation by the Policy Advisory Committee.

The *Build* Alternatives reflect new corridors, highway widenings, and a potential new port of entry at Jacumba. Under current operations at the Tecate port of entry (without vehicle restrictions), the following potential corridor alignments were tested, as shown in Figure 7.

Alternative 1a:	Border Corridor
Alternative 1b:	Pine Valley Corridor
Alternative 1c:	Widening Highway 94 between SR 188 and Buckman Springs Road and widening Buckman Springs Road between SR 94 and I-8.
Alternative 1d:	Widening Highway 94 west of SR 188

Under the assumption that the Tecate port of entry would not handle commercial vehicles, the following scenario was evaluated:

Alternative 3a:	Opening of the Jacumba-Jacumé port of entry

SANDAG's regional transportation model was used to prepare the traffic forecasts. The 2020 land use inputs for all alternatives, with the exception of Alternative 4, represent the 2020 population targets adopted by the County Board of Supervisors in 1998. Alternative 4, or Low Growth Alternative, uses a 10-year historical population growth trend for the Jamul/Dulzura and Mountain Empire community planning areas. Table 15, on page 52, shows both population forecasts.

2020 TRAFFIC FORECASTS: SUMMARY OF FINDINGS

This section describes the results of the traffic projections for the year 2020.

Overall Findings: No Highway 94 Improvements

Table 14 shows the forecast of average daily traffic for the rural Highway 94 corridor in the year 2020 and the projected level of service under the four No Build alternatives.

- Under existing operations (Alternative 1), the level of service (LOS) on Highway 94 would range between E and F for most of its extension (from Jamacha Road to Buckman Springs Road). Only east of Buckman Springs Road, the LOS is projected to be between C and E
- Restrictions to truck size would not be sufficient to result in level of service improvements on Highway 94 (Alternative 2)
- Under Alternative 3, if the Tecate port were to stop handling commercial vehicles, the level of service on Highway 94 would improve east of Route 188, and between Lyons Valley Road and Route 188. This is due to both the assumed reduction in trucks, passenger vehicles, and fewer commercial and industrial uses in the vicinity of the port of entry. However, for the sections of Highway 94 west of Route 188 (Lyons Valley to Otay Lakes), the LOS would only improve to LOS E. LOS D is considered an acceptable LOS for county roads. In addition, the LOS for the section of Highway 94 between Jamacha Road and Lyons Valley Road would not experience improvements

Low Growth Alternative

The study Committees proposed an additional alternative for evaluation (Alternative 4), which assumed the following:

- A land use scenario that forecasts 2020 conditions based upon the population growth that took place on the Highway 94 corridor in the last 10 years
- Vehicle crossings in 2020 at the Tecate port of entry are assumed to remain at the same level as in 1999
- No improvements to Highway 94

Land Use Data — Table 15, on page 52, illustrates the 2020 population projections for the communities that belong to the Jamul/Dulzura and Mountain Empire planning areas.

The "Trend" column reflects the 2020 population forecast based upon the growth trend that took place from 1990 to 1999 in each community. The "Target" column represents SANDAG's 2020 Cities/County Forecast which, in the unincorporated area of San Diego County, is based upon the 2020 Targets adopted by the Board of Supervisors in 1998.

Table 14
Rural Highway 94 Corridor Study
2020 Traffic Forecasts on Highway 94 for No Build Alternatives

Highway 94 Between:	Alternative Traffic Scenarios at Tecate Port of Entry	1998 ADT & LOS	2020 Forecasts Average Daily Traffic Range		Estimated Maximum Average Daily Traffic for Level of Service (LOS)			
					C	D	E	F
Buckman Springs Road and Jct. Interstate 8	Alt. 1: No Vehicle Restrictions	1,100	2,100	5,300	2,500	4,300	11,100	>11,100
	Alt. 2: Truck Size Restrictions	B	2,000	5,100	2,700	4,600	11,900	>11,900
	Alt. 3: No Trucks Across POE		2,000	5,100	3,000	5,400	13,900	>13,900
	Alt. 4: Tecate POE with 1999 Vehicle Crossings		1,700	4,500	2,700	4,700	12,100	>12,100
SR 188 and Buckman Springs Road	Alt. 1: No Vehicle Restrictions	1,600	6,400	8,000	3,000	5,100	11,900	11,900
	Alt. 2: Truck Size Restrictions	B	6,300	7,200	3,100	5,500	12,800	>12,800
	Alt. 3: No Trucks Across POE		5,700	6,600	3,600	6,300	14,800	>14,800
	Alt. 4: Tecate POE with 1999 Vehicle Crossings		3,000	5,500	2,800	4,700	11,000	>11,000
Otay Lakes Road and SR 188	Alt. 1: No Vehicle Restrictions	6,800	12,000	13,000	2,800	4,800	11,400	>11,400
	Alt. 2: Truck Size Restrictions	D	11,000	12,000	3,100	5,300	12,700	>12,700
	Alt. 3: No Trucks Across POE		8,000	9,000	3,700	6,500	15,600	>15,600
	Alt. 4: Tecate POE with 1999 Vehicle Crossings		6,700	7,500	3,700	6,300	13,500	>13,500
	Alt. 4: Including Passing Lanes		6,700	7,500	5,500	9,200	18,800	>18,800
Lyons Valley Road and Otay Lakes Road	Alt. 1: No Vehicle Restrictions	8,100	12,000	18,000	3,900	6,700	14,500	>14,500
	Alt. 2: Truck Size Restrictions	E	12,000	18,000	4,200	7,300	15,900	>15,900
	Alt. 3: No Trucks Across POE		10,000	15,000	5,000	8,900	19,100	>19,100
	Alt. 4: Tecate POE with 1999 Vehicle Crossings		8,500	14,000	4,200	7,300	15,700	>15,700

Table 14 (Continued)
Rural Highway 94 Corridor Study
2020 Traffic Forecasts on Highway 94 for No Build Alternatives

Highway 94 Between:	Alternative Traffic Scenarios at Tecate Port of Entry	1998 ADT & LOS	2020 Forecasts Average Daily Traffic Range		Estimated Maximum Average Daily Traffic for Level of Service (LOS)			
					C	D	E	F
Steele Canyon Road and Lyons Valley Road	Alt. 1: No Vehicle Restrictions	16,100	27,000	30,000	7,900	12,200	23,800	>23,800
	Alt. 2: Truck Size Restrictions	E	27,000	28,000	8,000	12,300	24,100	>24,100
	Alt. 3: No Trucks Across POE		25,000	27,000	8,300	12,800	25,100	>25,100
	Alt. 4: Tecate POE with 1999 Vehicle Crossings		23,000	25,000	7,700	12,000	23,400	>23,400
East of Jamacha Road and Steele Canyon Road	Alt. 1: No Vehicle Restrictions	14,700	23,000	34,000	7,900	12,200	23,800	>23,800
	Alt. 2: Truck Size Restrictions	E	23,000	34,000	8,000	12,400	24,300	>24,300
	Alt. 3: No Trucks Across POE		21,000	33,000	8,300	12,800	25,100	>25,100
	Alt. 4: Tecate POE with 1999 Vehicle Crossings		19,000	30,000	8,100	12,500	24,400	>24,400

Source: SANDAG, March 1999 and January 2000

Table 15
Rural Highway 94 Corridor Communities:
Historical and Forecast Population

Community Planning Area/ Sponsor Group	Population 1990	Population 1999	Average Annual Change 1990-1999	2020 10-Year Trend[1]	2020 Target[2]	2020 Absolute Change	2020 Low Growth Alternative
Jamul-Dulzura	8,509	10,270	2.2%	16,304	18,645	-2,341	16,304
Subtotal	**8,509**	**10,270**		**16,304**	**18,645**	**-2,341**	**16,304**
Mountain Empire							
Mountain Empire Remainder	106	110	0.4%	120	259	-139	120
Tecate	218	217	-0.1%	215	2,493	-2,278	215
Potrero	679	695	0.3%	736	684	-52	684
Lake Morena/Campo	2,653	3,130	1.9%	4,699	6,389	-1,690	4,699
Boulevard	1,164	1,506	3.0%	2,836	2,932	-96	2,836
Jacumba	543	656	2.2%	1,044	1,375	-331	1,044
Subtotal	**5,363**	**6,314**		**9,650**	**14,132**	**-4,586**	**9,598**
Total	**13,872**	**16,584**		**25,954**	**32,777**	**-6,927**	**25,902**

[1] 1990 to 1999 average annual growth rate applied to 1999 population.
[2] 2020 Targets from Planning and Sponsors Groups adopted by County Board of Supervisors, included in SANDAG's 2020 Cities/County Forecast (February, 1999).

Sources: 1990 U.S. Census; SANDAG 1999 Population Estimates; SANDAG 2020 Cities/County Forecast

The Low Growth transportation alternative uses the Trend forecast, with the exception of the community of Potrero, where the 2020 Target is used (lower population forecast). The Low Growth population forecast for both planning areas is projected at 25,902 residents, which is lower than the Target population by nearly 7,000 residents, or 21 percent lower.

Cross-border Traffic —Table 16 shows the 1999 two-way vehicle crossings at the Tecate port of entry as well as the 2020 projected traffic demand (unconstrained) for both passenger vehicles and trucks.

The Low Growth traffic alternative assumes in 2020 the same number of vehicle crossings through the Tecate port of entry as in 1999.

Table 16
Tecate Port of Entry
Two-Way Daily Vehicle Crossings

	1999	2020 Demand Forecast
Passenger Vehicles	6,595	12,877
Trucks	459	1,223
Total Vehicles	7,054	14,100

Sources: Data on northbound vehicle crossings from the U.S. Customs Service, Federal fiscal year 1999. Southbound traffic assumed same as northbound.
SANDAG, Tecate Port of Entry: Trade & Truck Traffic (1997), State Route 94 Long Range Traffic Forecasts (1998).

Overall Findings —Table 14, on pages 50 and 51, shows the traffic volumes projected on Highway 94 in 2020 under Alternative 4, as well as the forecast level of service.

- East of Buckman Springs Road, volumes would range from 1,700 to 4,500 daily vehicles and the LOS would be C and D. Between Route 188 and Buckman Springs Road, Highway 94 would carry between 3,000 and 5,500 vehicles daily, with level of service D.
- Between Otay Lakes Road and Route 188, traffic volumes would range from 6,700 to 7,500 vehicles. For the Otay Lakes to Route 188 segment, level of service was calculated under two conditions: without passing lanes and with passing lanes. Without passing lanes, LOS is projected to be E.
- Previously, Caltrans had proposed passing lanes at three locations: east of the Otay Lakes Road intersection, at Murphy's curve (west of Barrett Lake Road), and east of the Cottonwood Creek Bridge. Considering these operational improvements, the passing opportunities would increase compared to the existing highway. The LOS with the passing lanes would improve from E to D.
- Between Otay Lakes Road and Proctor Valley Road, traffic volumes would range between 8,500 and 9,000 vehicles, which would result in a LOS of E. However, the segment just east of Lyons Valley Road (to Jefferson Road) would be at LOS E and carry approximately 14,000 vehicles.
- West of Lyons Valley Road, the projected traffic volumes would result in a LOS between E and F and volumes would range from 19,000 to 30,000 ADT.
- Based upon these results, the proposed passing lanes would improve traffic flow between Otay Lakes Road and Route 188. Also, road improvements would be needed west of Lyons Valley Road.

Overall Findings: Alternative Corridor Alignments

The traffic projections for the year 2020 for Highway 94, under the alternative corridor alignments, are shown in Table 17.

a. **Border Corridor**

- Assumes no border-related trucks on Highway 94 west of Route 188.
- The Border Corridor would carry nearly 6,000 daily vehicles. It would connect to Highway 94 east of Cottonwood Creek (near Barrett Junction), so traffic diversion from Highway 94 to the Border Corridor would happen west of this junction.
- The segment of Highway 94 just west of Route 188 would carry approximately 12,000 daily vehicles, dropping to about 7,000 vehicles west of the Border corridor (LOS D). However, west of Otay Lakes Road, the projected LOS on Highway 94 would be LOS E. East of Route 188, the level of service on Highway 94 is projected to range from D to E.

b. **Pine Valley Corridor**

- Assumes no border-related trucks on Highway 94, east or west of Route 188.
- The Pine Valley Corridor would carry about 6,000 vehicles.
- The LOS on Highway 94 is projected to between D and E between Buckman Springs Road and Steele Canyon Road, dropping to LOS E-F west of the Canyon. East of Buckman Springs Road, the LOS on Highway 94 is expected to range between LOS C and D.

c. **Highway 94 East and Buckman Springs Road Corridor**

- Assumes no border-related trucks on Highway 94 east of Buckman Springs Road and west of Route 188. Highway 94 would be widened to four lanes between Route 188 and Buckman Springs Road. Buckman Springs Road also would be widened to four lanes in its entirety.
- This alternative would provide an acceptable level of service only on the widened segment of Highway 94. East of Buckman Springs Road, the LOS on Highway 94 would range between D and E. West of Route 188, Highway 94 would experience LOS E or worse.

d. **Highway 94 West Corridor**

- Assumes border-related trucks on Highway 94. This alternative tested widening Highway 94 from Jamacha Road to Route 188.
- LOS is projected to be between A and C throughout the west section of Highway 94 (west of Route 188). East of Route 188, Highway 94 would experience LOS ranging from D to E.

e. Opening of the Jacumba-Jacumé Border Crossing

- Assumes no border-related trucks either east or west of Route 188. Fewer industrial and commercial uses as well as warehousing are assumed in the vicinity of the Tecate port of entry. Approximately 5,000 vehicles (both trucks and passenger vehicles) would cross at the new border crossing.
- The LOS on Highway 94 is projected to range from D to E between Buckman Springs Road and Lyons Valley Road. West of Lyons Valley Road, Highway 94's LOS is projected at E and F. East of Buckman Springs Road, the LOS on Highway 94 would be between C and E.

Table 17
Rural Highway 94 Corridor Study
2020 Traffic Forecasts on Highway 94

Highway 94 between	Alternative Corridors	1998 ADT & LOS	2020 Forecasts Average Daily Traffic Range		Estimated Maximum Average Daily Traffic for Level of Service (LOS)			
					C	D	E	F
Buckman Springs Rd. & Jct. Interstate 8								
	Alt. 1a: Border Corridor	1,100	2,800	6,000	2,400	4,100	10,600>	10,600
	Alt. 1b: Pine Valley Corridor	B	2,100	5,300	2,400	4,100	10,600>	10,600
	Alt. 1c: Highway 94-Buckman Springs Rd. Corridor		2,700	5,800	2,400	4,100	10,600>	10,600
	Alt. 1d: Highway 94 West Corridor		2,700	5,800	2,400	4,100	10,600>	10,600
	Alt. 3a: Jacumba-Jacumé Crossing		2,900	6,100	2,400	4,100	10,600>	10,600
SR 188 & Buckman Springs Rd.								
	Alt. 1a: Border Corridor	1,600	7,700	9,500	3,000	5,100	12,000>	12,000
	Alt. 1b: Pine Valley Corridor	B	5,700	7,600	3,000	5,100	11,900>	11,900
	Alt. 1c: Highway 94-Buckman Springs Rd. Corridor		6,000	7,800	9,800	11,600	13,500>	13,500
	Alt. 1d: Highway 94 West Corridor		6,000	7,800	9,800	11,600	13,500>	13,500
	Alt. 3a: Jacumba- Jacumé Crossing		6,100	7,500	3,000	5,100	11,900>	11,900
Otay Lakes Rd. & SR 188								
	Alt. 1a: Border Corridor	6,800	7,300	12,300	4,800	8,600	18,600>	18,600
	Alt. 1b: Pine Valley Corridor	D	8,700	9,200	4,800	8,500	18,400>	18,400
	Alt. 1c: Highway 94-Buckman Springs Rd. Corridor		11,200	11,600	4,800	8,600	18,600>	18,600
	Alt. 1d: Highway 94 West Corridor		11,600	11,900	11,100	13,100	15,300>	15,300
	Alt. 3a: Jacumba- Jacumé Crossing		8,300	8,800	4,800	8,500	18,400>	18,400

Table 17 (Continued)
Rural Highway 94 Corridor Study
2020 Traffic Forecasts on Highway 94

Highway 94 between	Alternative Corridors		1998 ADT & LOS	2020 Forecasts Average Daily Traffic Range		Estimated Maximum Average Daily Traffic for Level of Service (LOS)			
						C	D	E	F
Lyons Valley Rd. & Otay Lakes Rd.									
	Alt. 1a:	Border Corridor	8,100	10,400	16,000	5,200	9,300	20,200>	20,200
	Alt. 1b:	Pine Valley Corridor	E	9,500	15,700	5,200	9,300	20,200>	20,200
	Alt. 1c:	Highway 94-Buckman Springs Rd. Corridor		11,700	17,900	5,200	9,300	20,200>	20,200
	Alt. 1d:	Highway 94 West Corridor		11,900	18,100	10,900	13,000	15,100>	15,100
	Alt. 3a:	Jacumba- Jacumé Crossing		9,700	15,900	5,200	9,300	20,200>	20,200
Steele Canyon Rd. & Lyons Valley Rd.									
	Alt. 1a:	Border Corridor	16,100	25,400	27,800	8,400	13,000	25,400>	25,400
	Alt. 1b:	Pine Valley Corridor	E	24,900	27,300	8,400	13,000	25,400>	25,400
	Alt. 1c:	Highway 94-Buckman Springs Rd. Corridor		27,000	29,400	8,400	13,000	25,400>	25,400
	Alt. 1d:	Highway 94 West Corridor		27,300	29,700	13,900	16,600	19,500>	19,500
	Alt. 3a:	Jacumba- Jacumé Crossing		25,000	27,500	8,400	13,000	25,400>	25,400
East of Jamacha Rd. & Steele Canyon Rd.									
	Alt. 1a:	Border Corridor	14,700	21,100	33,000	7,800	12,000	23,600>	23,600
	Alt. 1b:	Pine Valley Corridor	E	21,000	32,500	7,800	12,000	23,600>	23,600
	Alt. 1c:	Highway 94-Buckman Springs Rd. Corridor		22,700	34,200	7,800	12,000	23,600>	23,600
	Alt. 1d:	Highway 94 West Corridor		22,800	34,300	13,900	16,600	19,500>	19,500
	Alt. 3a:	Jacumba- Jacumé Crossing		21,100	32,900	7,800	12,000	23,600>	23,600

Source: SANDAG

ENVIRONMENTAL CONSTRAINTS ANALYSIS

ENVIRONMENTAL CONSTRAINTS ANALYSIS

INTRODUCTION

This chapter presents a summary of the Environmental Constraints Analysis for the Rural Highway 94 Corridor Study prepared for SANDAG by Myra L. Frank & Associates, Inc. and published in December 1999.

METHODOLOGY

The environmental constraints analysis for the Rural Highway 94 Corridor Study was prepared to identify locations and issues that may affect the choice of alternatives, future design decisions, the level of environmental documentation required, and the level of mitigation and coordination that may be appropriate as the project progresses. This analysis is not an environmental clearance document pursuant to the California Environmental Quality Act or the National Environmental Policy Act. It is, however, a precursor to such a document that is intended to identify further studies and areas of controversy. Because of the conceptual nature of the project description, the level of analysis is general and should be used accordingly. Further detail on impacts, as would be expected in an environmental clearance document, would require conceptual design of each alternative, including revised centerlines, overall roadway width, possible right-of-way acquisition on either side, etc.

This study addresses five corridors: State Route (SR) 94, Buckman Springs Road, Jacumba-Jacumé, Pine Valley Road, and Border Road (see Project Description, following). The rapid growth in Tecate, Baja California, and future growth in Jacumba-Jacumé is not a specific part of the constraints analysis, nor are alternatives on the Mexican side of the border, including subsidy of the tollway. The SR 188 connection to Tecate also was not part of this study.

The study area for the constraints analysis was defined as a 1.6 km (1 mile) wide corridor. This corridor was centered on existing roadways for the SR 94, Buckman Springs Road, and Jacumba-Jacumé alternatives. However, as the Pine Valley Road and Border Road alternatives do not follow existing roadways (with the exception of limited sections of Japatul Valley Road and Lyons Valley Road for the Pine Valley Road alternative), a 1.6 km wide corridor was established through undeveloped areas between I-8 and SR 188, and SR 94 and Otay Mesa Road, respectively. Information was gathered from a variety of published sources and from a "windshield" survey of the corridors. This methodology inherently leads to some disparity in the level of detail of information available over such a large study area. For example, published San Diego Association of Governments (SANDAG) information and mapping covers the entire county and has a uniform level of detail for all alternatives. Information provided by SANDAG included existing land use, water resources/floodplains, and some community facilities. This information is available throughout the 1.6 km corridor (and beyond). Census demographic data and information published in the County's General Plan also addresses the entire county, but the discussion of the eastern section of the study area is less detailed than that of the western, more developed area. Similarly, *Thomas Bros.* mapping is less detailed in the Jacumba area of the county and in the Cleveland National Forest.

Vegetation and species information was available from three sources. The City of San Diego Multiple Species Conservation Program (MSCP) study area extends as far east as approximately Barrett Junction and provides recently mapped vegetation and species information in a combined format. Information to the east of Barrett Junction was gathered from the County's vegetation maps and the California Department of Fish and Game Natural Diversity Database (Rarefind 2). While providing an overview, the specificity of these sources of information is not the same as that of the MSCP. As with other mapping, the entire corridor can be viewed and constraints noted.

A "windshield" survey provides a different type of information. A brief field review of the study corridors allowed for the documentation of resources and constraints adjacent to the existing roadways and is particularly useful to understanding visual resources and existing development. It also reveals potential physical constraints such as bridge openings, challenging topography, and possible historic structures. The information from the windshield survey has been included in the constraints analysis but it should be noted that the corridor improvements that ultimately are proposed may not necessarily be widening of the existing roadways. This type of survey was not performed for the Border Road alternative nor most of the Pine Valley Road alternative.

PROJECT DESCRIPTION

Five alternatives were reviewed, as described below in Table 18 and shown on Figure 8. A 1.6 km wide corridor centered on the existing roadway provided the basic study area for SR 94, Buckman Springs Road, and Jacumba-Jacumé alternatives, and the constraints along the existing roads were especially noted. A 1.6 km corridor through predominately undeveloped land was defined for the Pine Valley Road and Border Road alternatives as they do not follow existing roads. The remainder of this report summarizes each alternative, then presents the constraints analysis. For some topics, all five alternatives are discussed together, while in others, each alternative is described separately.

Table 18
Project Components

Component	Description
SR 94	The study limits are Avocado Blvd. on the west and Buckman Springs Road on the east. Road widening from 2 to 4 lanes is being considered between Jamacha Rd. on the west and the Buckman Springs Road/SR 94 Junction.
Buckman Springs Road	Road widening from 2 to 4 lanes between I-8 and SR 94.
Jacumba - Jacumé Port of Entry	Widening of Old Highway 80 between Jacumba and I-8 to the east of Jacumba, associated with reopening the Port of Entry at Jacumba. Variations of this alternative are (1) improvement of the Carrizo Gorge/I-8 interchange and widening of Carrizo Gorge Road, and (2) improvement of the In-Ko-Pah Road/I-8 interchange and widening of In-Ko-Pah Road.
Pine Valley Road	The primary alternative improves the northern section of Japatul Valley Road near I-8 and creates a new road through the Cleveland National Forest, east of Barrett Lake, connecting to SR 94 immediately west of Potrero. The western variation includes improvements to more of Japatul Valley and Lyons Valley Roads and a new road segment from south of the Japatul Valley Road/Lyons Valley Road Junction, west of Barrett Lake, connecting to the primary component northwest of Potrero. The eastern variation follows the primary alternative to east of Barrett Lake, then extends further east before meeting SR 94 west of Potrero.
Border Road	New road along the U.S. – Mexico International Border between SR 94 at Barrett Junction and Otay Mesa Road in San Diego.

Sources: SANDAG, 1999; Myra L. Frank and Associates, Inc., 1999

SUMMARY BY COMPONENT

SR 94

The SR 94 component, which is the longest under consideration, would have several constraints, including:

- Sensitive species and habitats are prevalent along Cottonwood and Dulzura Creeks and elsewhere. The San Diego National Wildlife Refuge (which incorporates other reserves) crosses and abuts the highway. Coastal sage scrub, coastal sage-chaparral scrub, and oak woodland are considered sensitive upland communities that would require substantial mitigation. Wetland and riparian resources are extensive and would require mitigation as well. Focused surveys for listed species may be required. The corridor is within the Multiple Species Conservation Program (MSCP) boundary and crosses a Biological Core Area and Linkage.
- Known archaeological and historic resources abut the highway and complete surveys and evaluations would be required. Archaeological and historic resources are extensive.
- Existing development abuts the highway and includes many residential and commercial uses and community facilities that would require relocation or mitigation.
- Existing communities would be further divided if the existing alignment is used.
- The roadway passes through agricultural reserves and wildlife preserves.
- There are a variety of federal, state, and local landowners.
- Visual impacts would be significant.
- Several water resources that would be affected are drinking water supplies.

Buckman Springs Road

The Buckman Springs Road component would have several constraints:

- Sensitive species and habitats are prevalent in the northern section of the study area (in the Cleveland National Forest). Focused surveys for listed species may be required.
- Known archaeological resources are present and complete surveys (of both archaeological and historic resources) and evaluations would be required.
- A few existing community facilities would require relocation or mitigation. Some residential uses are adjacent as well.
- The roadway passes through agricultural reserves.
- Existing development abuts the highway and includes many residential and commercial uses and community facilities that would require relocation or mitigation.
- There are a variety of federal, state and local land owners, as well as the interests of the Campo Indian Tribe, to consider.

- Visual impacts could be substantial.

Jacumba-Jacumé Port of Entry

The Jacumba-Jacumé Port of Entry component would have several constraints, including:

- Sensitive species and habitats are present. Focused surveys for listed species may be required.
- Known archaeological and historic resources abut the highway and complete surveys and evaluations would be required. Archaeological resources are extensive.
- Existing development at towns abuts the highway and includes residential uses (including mobile homes) and community facilities that would require relocation or mitigation. Some residents may be low-income. The variations of this alternative would have differing effects.
- There are a variety of federal, state and local landowners.
- Visual impacts could occur.

Pine Valley Road

The following is a list of constraints for the Pine Valley Road alternative:

- All variations cross the Cleveland National Forest; the primary component and eastern variation traverse designated Wilderness Areas.
- Known archaeological resources are present and complete surveys (of both archaeological and historic resources) and evaluations would be required.
- Sensitive species and habitats are present. Focused surveys for listed species may be required.
- Visual impacts would be significant.
- Several water resources that would be affected are drinking water supplies.
- Large agricultural preserve overlays the Cleveland National Forest.

Border Road

Constraints of the Border Road alternative include:

- Sensitive species and habitats are present. Focused surveys for listed species may be required. The corridor is within the Multiple Species Conservation Program (MSCP) and crosses two Biological Core Areas.
- Known archaeological resources are present and complete surveys (of both archaeological and historic resources) and evaluations would be required.

- The corridor traverses a designated Wilderness Area.
- Visual impacts would be significant.

COMPARISON MATRIX

Based upon this constraints analysis, the Jacúmba–Jacumé alternative (or one of its variations) would have the fewest adverse environmental impacts in comparison to the other four alternatives. A detailed environmental analysis would still be required once conceptual design information is available.

Table 19 provides a comparison of the five alternatives analyzed in this constraints study.

Table 19
Constraints Comparison Matrix

Topic	ALTERNATIVE				
	SR 94	Buckman Springs Rd	Jacumba-Jacumé	Pine Valley Road	Border Road
Land Use	Residences and development adjacent; parks and refuges adjacent; communities of Jamul, Dulzura, Potrero, and Campo.	USFS land, County Park, and Campo Reservation adjacent; residential in southern half of corridor.	Residences and commercial adjacent in Jacumba; wildlife management area adjacent; proposed Jacumba Valley Ranch development. Anza Borrego State Park adjacent.	Residences at north and south ends. Traverses Cleveland National Forest/ Wilderness Area, depending on variation.	Traverses Otay Mountain Wilderness Area.
Agricultural Preserves	2 preserves	Several preserves.	No preserves.	Preserve overlays most of the Cleveland National Forest.	1 preserve.
Community Facilities	5 schools, 2 libraries, 3 churches, 3 parks adjacent.	2 schools, 1 park adjacent.	1 school, 1 library, 1 park adjacent.	1 park, 1 school (eastern variation) and Barrett Honor Camp (western variation).	1 school.
Consistency with Plans	No inherent conflicts; design, visual and other unresolved issues. Plan area is concerned with dark night skies, visual, and rural character.	No inherent conflicts. Rural character and recreation/scenic features important. Design, visual, and other unresolved issues	No inherent conflicts. Rural character and recreation/scenic features important. Design, visual, and other unresolved issues	Conflict with Wilderness Area. Design, visual, and other unresolved issues.	Possible conflict with wilderness area; Resource Conservation Area (RCA) present; design, visual and other unresolved issues.
Community Character	Rural, historic towns; project could significantly affect.	Rural, no commercial areas; project could affect.	Rural and isolated; former resort area; project could affect but minor compared to proposed development.	Rural, no commercial areas.	Undeveloped.

Table 19 (Continued)
Constraints Comparison Matrix

	ALTERNATIVE				
Topic	**SR 94**	**Buckman Springs Rd**	**Jacumba-Jacumé**	**Pine Valley Road**	**Border Road**
Growth	Growth rate 2x rest of county; suburbanization pressures.	Growth rate 3x rest of county; Cleveland National Forest, may buffer growth pressures.	Growth rate 3x rest of county; large planned development, airport account for growth projections.	Cleveland National Forest restricts growth. New road would likely induce growth.	Eastern end growth rate is 2x county average. New road would likely induce growth.
Socio-economic Effects	Substantial residential and business acquisitions likely throughout corridor	Acquisitions possible in southern half.	Acquisitions likely within small Jacumba area.	Acquisitions are possible near north end.	Possible acquisitions at east end depending on the alignment.
Environmental Justice and Tribal Lands	No known effects	Within census tract with greatest number of minority and low income. Tribal lands present.	Within census tract with greatest number of minority and low income.	Partially within census tract with greatest number of minority and low income.	No known effects.
Cultural Resources	77 archaeological sites within 30 meters; Campo Stone Store is listed resource; other potentially historic trails, 10 bridges, 40 structures, and a historic District.	18 archaeological sites within 30 meters; potentially historic 2 bridges, 3 structures, 1 marker	24 archaeological sites within 30 meters; potentially historic trails, US 80, 3 bridges, 4 structures, and Table Mountain Historic District. 2 State Land-marks.	69 archeological sites within 1.6 km corridor. Several historic architectural sites relating to water transport. Possible sites in Cleveland National Forest.	24 archeological sites within 1.6 km corridor; potentially historic trail.
Sensitive Species and Habitats	San Diego National Wildlife Refuge, MSCP, and other reserves and RCAs; substantial potential impacts to wetlands, uplands, and sensitive species.	Cleveland National Forest; sensitive species in northern half of corridor.	Substantial potential impacts.	Substantial potential impacts including Cleveland National Forest, RCA, and Wilderness Area.	Substantial potential impacts including RCA, Wilderness Area, and MSCP.

Table 19 (Continued)
Constraints Comparison Matrix

	ALTERNATIVE				
Topic	**SR 94**	**Buckman Springs Rd**	**Jacumba-Jacumé**	**Pine Valley Road**	**Border Road**
Floodplains and Water Resources	8 resources affected, drinking water supplies.	2 resources affected.	4 resources affected.	4 resources affected, including drinking water supplies.	1 resource affected, including drinking water supplies.
Visual Resources	SR 94 a 3rd priority Scenic Hwy in the General Plan and a 1st priority Scenic Hwy in the Jamul/ Dulzura Subregional Plan; natural features.	Buckman Springs Rd a third priority; natural features.	Natural features.	Natural features. Roadless area	Natural features. Roadless area
Paleontology	Low Sensitivity.	Low sensitivity; unique geology.	Low sensitivity.	Low sensitivity.	Low sensitivity.
Soils	Well drained sandy loams, no constraints.	Loamy coarse sand or coarse sandy loam, no constraints.	Loamy coarse sand or coarse sandy loam, and sandy/silty loam, no constraints	Sandy loams with some rocks.	Silt loams and rocky.
Length of Alignment (approx.)	58.1 km	36.0 km (includes 20.2 km along SR 94)	11.5 km	27.8 – 31.7 km	22.1 km
Permitting and Doc. Requirements	All would likely require an EIR/EIS and include detailed technical studies. Permitting for 404 and 401 would be extensive, as would any permitting for impacts to the MSCP or wildlife refuge. Section 4(f) would be required for impacts to parks, wildlife refuge, or significant cultural resources.				

Source: Myra L. Frank and Associates, Inc., 1999

PRELIMINARY
COST ESTIMATES

PRELIMINARY COST ESTIMATES

Caltrans staff prepared preliminary planning level cost estimates for the five build alternatives evaluated. Table 20 shows the cost estimates for two-lane roads, while Table 21 presents the estimated cost for four-lane roads.

Table 20
Rural Highway 94 Corridor Study
Preliminary Cost Estimates for Alternate Corridors
2-Lane Roadway

Description	Length (mi.)	Cost ($millions) Low	Cost ($millions) High	Remarks
BORDER CORRIDOR				
U.S.-Mexico Border at Tecate - Future SR 11 at Otay Mesa	20	$500	$850	new/existing alignment, difficult terrain, curb/shoulder improvement, climbing lane
PINE VALLEY CORRIDOR				
U.S.-Mexico Border at Tecate - Pine Valley (northeast alignment)	22	$450	$800	new/existing alignment, difficult terrain, climbing lane
U.S.-Mexico Border at Tecate - Pine Valley (northwest alignment)	21	$500	$850	new/existing alignment, difficult terrain, curb/shoulder improvement, climbing lane
U.S.-Mexico Border at Tecate - Pine Valley (bridge alignment)	22	$650	$1,100	new/existing alignment, difficult terrain, bridge, climbing lane
HIGHWAY 94-BUCKMAN SPRINGS ROAD CORRIDOR				
U.S.-Mexico Border at Tecate - I-8 Buckman Springs Interchange	25	$150	$200	existing alignment, difficult/moderate terrain, new bridge, curb/shoulder improvement, climbing/turning lane
HIGHWAY 94 WEST CORRIDOR				
U.S.-Mexico Border at Tecate - Avocado Blvd. (Rancho San Diego)	27	$150	$200	existing alignment, difficult/moderate terrain, curb/shoulder improvement, climbing lane
JACUMBA CROSSING				
U.S.-Mexico Border - I-8 Carrizo Gorge Interchange	3	$10	$13	new/existing alignment, easy terrain, passing lane
U.S.-Mexico Border - I-8 In-Ko-Pah Gorge Interchange	5	$22	$30*	new/existing alignment, easy/moderate terrain, curb improvement, passing lane

Note: Preliminary cost includes construction, support and right of way for a 2-lane roadway.
Right of Way costs included **ONLY for NEW** alignments.

Source: Caltrans District 11 Advanced Planning, May 1999

Table 21
Rural Highway 94 Corridor Study
Preliminary Cost Estimates for Alternate Corridors
4-Lane Highway

Description	Length (mi)	Cost ($millions) Low	Cost ($millions) High	Remarks
BORDER CORRIDOR				
U.S.-Mexico Border at Tecate - Future SR 11 at Otay Mesa	20	$700	$1,000	new/existing alignment, difficult terrain, curve improvement
PINE VALLEY CORRIDOR				
U.S.-Mexico Border at Tecate - Pine Valley (northeast alignment)	22	$750	$1,100	new/existing alignment, difficult terrain
U.S.-Mexico Border at Tecate - Pine Valley (northwest alignment)	21	$700	$1,000	new/existing alignment, difficult terrain, curve improvement
U.S.-Mexico Border at Tecate - Pine Valley (bridge alignment)	22	$950	$1,500	new/existing alignment, difficult terrain, bridge
HIGHWAY 94-BUCKMAN SPRINGS ROAD CORRIDOR				
U.S.-Mexico Border at Tecate - I-8 Buckman Springs Interchange	25	$300	$400	existing alignment, difficult/moderate terrain, new bridge, curve improvement
HIGHWAY 94 WEST CORRIDOR				
U.S.-Mexico Border at Tecate - Avocado Blvd. (Rancho San Diego)	27	$350	$500	existing alignment, difficult/moderate terrain, curve improvement
JACUMBA CROSSING				
U.S.-Mexico Border - I-8 Carrizo Gorge Interchange	3	$22	$30	new/existing alignment, easy terrain
U.S.-Mexico Border - I-8 In-Ko-Pah Gorge Interchange	5	$50	$60	new/existing alignment, easy/moderate terrain, curve improvement

Note: Preliminary cost includes construction, support and right of way for a 4-lane conventional highway. Right of Way costs included **ONLY for NEW** alignments.

Source: Caltrans District 11 Advanced Planning, May 1999